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THE PSYCHOLOGICAL REVIEW

THE RECONSTRUCTION OF PSYCHOLOGY[1]

BY JOSEPH JASTROW

University of Wisconsin

A half-century retrospect furnishes an inviting motive for bringing together groups of devotees to the several sciences that have become creative forces in the world of today. In the science of mind the vista discloses a comprehensive reconstruction. The physical change of scene is the more conspicuous, in that it is demonstrable in the telephone, the phonograph, the X-ray, the radio, the automobile, the aëroplane, the motion-picture, and the numerous progeny of like ancestry, that minister familiarly to the multiplied needs of the American citizen of 1926, yet were hardly dreamt of—one may not say in the philosophy—but in the practice of 1876. The 'Yankee at King Arthur's Court' could readily astound his assumed retrospective contemporaries; but the super-Yankee of today could play the same rôle of incomprehensible wizard at the court of Queen Victoria. The intellectual forces responsible for the shift of scene, are the ideas, principles, concepts, theories, that have developed the technique of the laboratory of pure science; they have created a Pasteurized, Roentgenized, Marconiized, Einsteinized, and in so many other ways scientized world, in which we live so richly, move so complexly, and have in part our intellectual being.

It is in a comparable scale of reconstruction that I place the change of outlook, the contrast of mental habit and

[1] An address delivered at the 50th Anniversary Celebration of Johns Hopkins University, October 22, 1926.

habitat, to which psychology may properly lay claim. Mental horizons have altered as significantly as the physical scene. Psychological progress does not register such monumental triumphs nor perhaps the sweeping changes that follow new discoveries in physics, in chemistry, in mechanics, in medicine; but measured by their influence in shaping the ideas and ideals that men live by, in furnishing the equipment and maturing the bent of the twentieth-century mind, and in directing those intimate stimulations and regulations without which human life would be meagre and barren, its contributions are fully comparable. For however modern our mental make-up, we share the eternal human needs, and live not by bread alone—nor yet by vitamines and calories—but by participation in the intellectual, the social, and (in the liberal sense) the spiritual values that the newer knowledge confers, and by loyalty to the accumulated and ever revised wisdom of the ages. And it is the outstanding feature of our reconstructed psychology that it realized and accepted the obligation to apply to education, to social relations, to practical affairs, to the control of human behavior generally, normal and abnormal, desirable and undesirable, the conclusions arising from the scientific study of the mental side of man.

Today established in the fellowship of the sciences, psychology as a celebrant of about the same age as the University which is our host and which was among the first to offer it hospitality, may well take this occasion to acknowledge the cordial recognition by the older sciences—a reception tempered by a wisely traditioned caution. As it is not my intention to tell the story of psychology—which still awaits popularization—I need not recount the stages of its declaration of independence from a colonial outpost of philosophy or later, a protectorate of physiology. It is more to the point to indicate that only through the progressive contributions of the fellow-sciences, of the biological group particularly, was the emergence of psychology as we know it made possible. The inspiring panorama of the phenomena of life revealed by a Darwinized outlook was propitious to the inclusion and, indeed, the emphasis of the psychic in the interpretation of

animal and human behavior; for the outstanding biological equipment of man is his brain, the index of his unique psychic endowment. Modern psychology had a fortunate childhood because it came upon the scene when the struggle for existence of evolution had already been successfully waged by its historical sponsors.

Of comparable significance was the turn to the exact, objective, experimental method of the laboratory—an essential allegiance in the citizenship requirements of all modern *Wissenschaft.* Stanley Hall frequently expressed regret that Wundt, whose contributions more definitely than that of any other psychological pioneer, marked the acceptance of the psychologist as a scientist, served his apprenticeship with Helmholtz the physicist, and not with a leader of the biological habit of mind. Yet the parent of our prolific 'Psychologies' bears the title 'Physiological Psychology' and rightly so. That the modern psychologist is biologically minded and in that sense behavioristic, yet with an added insight, a special flair that derives from a deep interest in the mental mechanisms and in the products of the psyche in the living sociological setting is generally recognized. In the spirit of a League of Psychologists to conciliate warring schools, I propose to give the term Behaviorism this most inclusive significance.

I

In this spirit I reach the approach and procedure which I shall follow in projecting the reconstruction of psychology as it has become our scientific heritage. For I shall rely upon a review, more aptly an *aperçu* of the distinctive movements in recent psychology to convey the composite picture, rather than pursue any historical sequence of development. The two trends to which I accord the leading influence have in part a common origin and temper. The one is the comprehensive fact that psychology has become a *practical discipline,* finding its data and measuring its service notably in application to the living interests and going concerns of the human species. The other is the equally reconstructive perspective that makes *behavior* the central concept, the dominating as-

pect of the psychic. This objectivism is broad enough to include the natural history of the mind, surveying its fauna and flora in exploratory and descriptive and explanatory intent, making the psychologist definitely the naturalist of the mental domain; to include the experimental pursuits of the laboratory, which rightly claim precedence in shaping the problems and determining the concepts by which the science shall advance; to include as well the clinical aspect of the mental life derived more particularly from the illumination that lies in the abnormal, but readily extended to the temperamental and 'sociological' variations that underlie character and condition human response; to include specifically the survey of the mind's cultural past, the social psychology of the primitive man and its survivals. Though these several frontiers adjoin different provinces, their incorporation is due to a common exploratory interest, an objective method, a clinical sense, employed in interpreting human nature as nature made it and as the mind of man (for it is both instrument and object of study) remade it.

The reconstruction of psychology presents a change of front all along the line; but it is an orderly line commanded by a common purpose. I may be disclosing a Freudian wish in calling the reconstruction a behavioristic one. As so many who are enthusiastic advocates of peace hesitate to be known as pacifists, because most illogically, that term has been appropriated by or wished upon the extreme irreconcilable faction of a momentous movement, so I must explain that the behaviorism here placed first and foremost is no endorsement of that specialized use of the term for which Watson claims an American and a proprietary copyright; and which (to cite but three British critics in the hope of seeing ourselves as others see us) Lloyd Morgan calls radical behaviorism, whose presumption C. K. Ogden finds amusing, and McDougall irritating to the provocation of naming it a bastard product. I question the validity of the copyright and have no hesitation in infringing upon the trade-mark, if such it be. Behaviorism, like pacifism, is too valuable a term and too important a movement to be sacrificed to a factional appropriation or a remediable misconception.

It is well to set forth that there were explicit and not merely implicit behaviorists long before Watson was exhibiting his first conditioned reflex in the nursery. Clearly William James was one of them; and the inspirer of the pragmatic approach which James so ably developed, Charles S. Peirce, was another, though his primary interest was logical rather than psychological; Stanley Hall was a catholic behaviorist almost prophetically aware of its wide implications, and so was many another leader and follower of the movement thus inaugurated, while European supporters of the same period could be as readily enumerated. The policy of throwing out the child with the bath is a foolish one, however boldly defended.

If we return to the era of emergence of the modern outlook, we readily recognize that the speculative and doctrinative type of introspection was doomed; the concepts and analysis of the mental mechanisms and processes were faultily oriented; there was much of significance overlooked, and much unwarranted assumption in the entire presentation of that formative period of modern psychology. Yet this historically inevitable limitation does not make the junk-pile the only fit depository for what fails to meet the criteria of our refined standards and revised concepts. The tilting by the radical behaviorists against the windmills of consciousness—not in any sense Quixotic, for that was a romantic venture—seems almost the bat-mindedness of a petulant cavalier. But perhaps, like the futurist painting, one should not take the secession too seriously. Inasmuch as a convincing critique of the rise and fall of radical behaviorism is available in Roback's review, it suffices to indicate that the uniform of scientific objectivity which Watsonian behaviorism legitimately wears —chevron and all—belongs as rightly to other divisions of the psychological army; but the red badge of courage and scientific rectitude is strangely attractive to the younger recruits and is readily advertized in glorified promises of immediate achievement. Iconoclasm is not an eminently constructive occupation, and if carried on in a sporting vein, or still less commendably, with the irresponsibility of the *enfant*

terrible throwing stones at the windows of already deserted buildings, will hardly advance Psychology or its reputation.

When this mood is absent there is still to be detected in the behavioristic extremist the fallacy of undue simplification. In many a scientific pursuit it is easy to reach a solution if we ignore all the essential and intricate complications; and the same holds of practical problems, making this fallacy common in the administrative temper. The comment that Bacon despite his monumental contributions wrote upon science like a Lord Chancellor may still be pertinently recalled. The program of the behaviorist to see how far he can go in the interpretation of the world of mind by the simpler objective methods that are almost completely satisfactory in the lower stages of behavior, was an admirable one; and has been well pursued with valuable results. But the attempt to push it by hook or crook to the regions where its effectiveness gradually weakens has been pursued not wisely but too far, has involved an acrobatic or verbalistic treatment, an ignoring of the realities, a juggling with formulæ, such as stimulus and response, denatured of the very quality that gives them significance, has deprived the movement of the advantage of affiliation with more circumspect supporters and obscured the proper appraisal of its valid place in the reconstruction of psychology.

One is tempted to resort to a parallel which has in common only the same spirit of ignoring and asserting, and results in both instances in the distortion of a genuine truth into an insidious fallacy. The concrete data upon which radical though scientific behaviorism builds, as of that unscientific departure bearing the misnomer of Christian Science, are not wanting; but in their employment are, to say the least, abused or overworked. This is true of the conditioned response, and particularly of the interesting but equivocal fact that the salivary gland may be psychically stimulated, and the result, like the classic Cheshire feline, appear as the grin without the cat. Whether this discovery heralds the day when we shall be able to cultivate grins without the inconvenience of cats, or whether it means more simply that the hunger-

trend in the dog is so pervasive that almost anything may become a sign of food, is an issue that may be deferred. In parallel argument, that the symptoms of illness may be psychically induced and removed does not justify the conclusion that disease is an 'error of mortal mind,' any more than that consciousness is an error of retarded psychologists. If the author of that most distinctive of American cults—far outrivalling the popularity of behaviorism—had chosen a title with more logic than could be expected in the premises, she might have called it 'Science and Salvation: with Key to the Scriptures'; and then an unsympathetic critic might have suggested as the title of the text-book of radical behaviorism, 'Science and Salivation: with Key to the Strictures.' I deplore the spirit of this extreme left wing of Behaviorism for the reason that it detracts from its own valuable contributions, and deprives itself of the congenial coöperation of other members of the party. For I am convinced that behaviorism has come to stay; but to serve its mission it must be interpreted with a large comprehensiveness. And no less is the psychogenic principle, of which Christian Science is a grotesque misstatement, a vital factor in the reconstruction of psychology. What is valuable is the behavioristic principle, emphasizing the objective approach, the significance of total behavior, the formula of stimulus and response, the physiological conditioning of the psychic mechanisms in nerve and muscle and gland, the importance of the early original untaught reaction patterns and their inherent elasticity, in the human species particularly, that permits their large direction by the environment. This reconstructive legacy is available to our psychological heirs, and it is richer through the bequests of behaviorists of all types and persuasions.

II

We come next to applied psychology and its practical temper. Its most conspicuous product, mental testing, was the direct issue of the laboratory objectivism, but rapidly outgrew its primary orbit of application. So rapid has been its growth that there is real danger that the tail may wag the

dog, or more explicitly that the pure psychologist may find his occupation gone, and the purity tainted, at the worst, by commercial pressure and unacademic incomes. To resist the stream is futile. Under the American temper, Niagara is no longer a natural wonder to contemplate but a power-house to exploit. Yet though regrettable, it is equally true that any close follower of the Wundtian tradition would find himself in splendid isolation, and, if he prefers, glory in it. To steer wisely between these opposed courses requires a steady sense of balance and proportion.

Broadly interpreted, the issue involves the wholesome relations of theory and practice. I venture to repeat an illustration I have used elsewhere, because in turn it illustrates the danger of the narrow behaviorism that finds the complete account of a psychic situation in describing objectively what a man is doing, ignoring all else. If 'behavioristically' you observe a man and his dog taking a walk, you can come to no other conclusion than that the man is following the dog; for the knowing canine is ever in the lead and the man is trailing behind. The 'introspectionist,' whom some call the 'mentalist,' but is in reality a catholic psychologist, faces the disdain of the superior behaviorist because through evidence supplied by the tabooed consciousness, he insists that despite appearances the dog is following the man. At a turn of the road there may be a moment's hesitation; but at the slightest sign of the master's intention, the dog runs ahead with a convincing air that he was going that way anyhow. Well! Theory is the master and practice is the dog. Every science—and psychology is no exception—must be free to develop its own problems and direct its advance through the lead of that type of analysis that we call theoretical. The *Gestalt* psychology follows the right tradition in holding that a correct basic concept is of the utmost consequence, however slightly or remotely it affects our practice; just as we do signal honor to the expounder of the theory of relativity, though it requires most elaborate devices in which the solar system is itself converted into a laboratory, to verify its suppositions. In a practical-minded civilization pure science needs protection. Yet in the half-century retro-

spective view the converse danger was at the outset the more imminent.

Left to himself, (and even a laboratory may serve as a cloistered retreat) without the corrective of a real world in which whatever psychological forces there are operate and find their milieu, the psychologist may yield to the temptation of pursuing a formula, conceiving a structure or principle, cherishing a system that affords a logical or an æsthetic satisfaction; the more common temptation is to pursue a favorite interpretation in an investigation that took its rise in a concrete set of data. Much of the literature of psychophysics and the equations of Herbart and Fechner are rather sad instances of heroic effort spent for the most part on unprofitable developments. In the minute investigation of sensation and the tedious comparison of lifted weights it was forgotten that this operation, like every other, had a meaning in the part it may have played in adapting the organism to meet the conditions of the environment. To conceive sensations and stimuli as abstract or even as instrumental realities like grammes or candle-powers or watts or ohms, and then formulate laws of their relation after the manner of velocities and the equations of the chemical compounds, was a plausible but not a valid procedure. Its profit lay in the cultivation of the quantitative method, but became fruitful only when that method was itself adapted to the variable biological factors determined by the organism and its natural history. Its correction lay in the genetic approach, which while recognizing the human machine and its composition, recognized also the distinctive organic character of the mechanism. To illustrate: While larger stimulations produced larger effects, as the psychophysic law stated, there were equally instances in which, like the tickle sensations, very slight stimulations produced marked reactions; while in the case of light-sensations, the adaptations to both day and night vision, and in temperature, the close relation to the requirements of a warm-blooded animal, determined the behavior of the sensory apparatus. It is not this type of fallacy, the 'idol' of following the quantitative semblance to the neglect of the qualitative reality that

today requires a danger-signal, but the related one that what is measurable is necessarily important. Both involve the same tendency to overestimate the place of curves and tables, the same overlooking of the fact that in deciding *what* to measure and to plot, assumptions are involved which must be critically appraised; that the test of the psychological test is the shrewdness of analysis which it embodies. This danger in other guise we shall meet presently in considering the more elaborate mental mechanisms.

Meanwhile, by way of summary, may be restated the leading factors of the reconstruction. We note the convergence of several ideas, projects, interests, instruments, purposes, inspired by the conviction that the life mental is an intimate correlate of the life bodily, that we never touch bottom until we relate psychic events to a physiological basis; that soma and psyche have evolved together, and in their evolutionary setting find the clue to the meaning of their functions; that this organic nature and the behavior which it manifests are the two foci of the psychological orbit; that the method of study must be objective, observational and experimental; that processes are important but products are the actual data and the ends of study; that in this view there is always the reference back to the rôle and effect of any psychic factor upon the total behavior of the organism; that human products past and active are saturated with psychic deposits, meanings, mechanisms, and forces at different stages of development, operative under different combinations, traceable in the life of the race, of the child, of the variants of sociological and abnormal types and conditions.

III

When under the impetus of these major leads and determining concepts, the reconstructive synthesis of psychology took form and substance, as usually in the wake of creative periods in science, unforeseen consequences followed; and it is these corollaries, by-products, novel vistas and insights that will best serve to complete the picture.

The genetic view of the total psychic endowment and its

constituent functions was not absent from the earlier modernized psychology, but became dominant and vital only in the reconstructive enterprise; thus was psychology twice-born. The genetic theme is implicit in the evolutionary drama; but it awaited a fresh outlook, and enriched pragmatic interest, and a vast amount of reconstructive study to make explicit its manifold bearings, and make them practically and popularly available. Consider the present-day view of the nature of childhood. Claims like comparisons are odious; yet it is a pardonable exaggeration to say that ours is the first generation to which was made articulate and intelligible the full meaning of childhood,—certainly as notable an advance as telephoning or broad-casting, but unfortunately not as widely utilized. That a child is not an adult in miniature, and for much of its career not primarily an adult in the making, but a priceless revelation of evolutionary psychology, (I cite the recent work of Piaget as an instance) a rich mine of otherwise inaccessible history, more precious than are fossils to the zoölogist, is a conclusion that grows in significance as its implications unfold. I appreciate the worldly wisdom of a clever woman who decided in the mood of Barrie's play, that if she had a second chance, she would prefer to be born a widow with two children; but by escaping the pangs of growth she would lose the intimate insight of living through the genetic cycle. Yet 'What Price Maturity' is a fitting dramatic theme. Psychologists alive to their calling will consent that a little child shall lead them. But how and whither?

Stanley Hall found his clue in the recapitulation theory, making the child rehearse the history of the race. But that attractive hypothesis—even in embryology where it finds strongest support—affords only an intermittent illumination, and is eventually a light that fails. What we may accept is the principle that the child is an authentic embodiment of the earliest, racially oldest, most persistent, truest to nature, depository of natural behavioristic psychology. The child perspective of function and clues to behavior, the native spontaneities as well as their inhibitions, are representative of all the urges, appetites, passions, curiosities, satisfactions,

thwartings, conflicts, sublimations, that make life, and make its problems as well as its rewards—its liabilities and assets.

Our immediate ancestors were so much troubled, as we continue to be, with what we must make of the child to fit it to the harsh and manifold demands of an adult conventionalized world, as to be blinded to what the child-response signifies in its own right. The stress of the practical is insistent; most of us are concerned not with studying children but in bringing them up, and by the same logic we want doctors to cure us and care little whether we are interesting medical cases or not. We moralize instead of observing; but we are not as inveterate nor as consistent offenders as were our parents and grandparents. Even when child-study appeared, it was more a chronicling and recording than an analysis and an interpretation. The earlier phases of child-study —not so limitedly nor so sentimentally as the kindergarten— developed a cult rather than a science. It was only when the total resources of physiology and psychology—and latterly of mental hygiene—were levelled upon the child responses and their conditioning, that this most important phase of genetic psychology (reënforced by the equally modernized studies of animal behavior, of our many times removed cousins, the anthropoid apes particularly) began to yield valid and valuable conclusions.

Worthy of a separate enumeration is the recognition of the place of the primitive psyche in the interpretation of behavior-trends from the simplest to the most complex. The value of this approach appears most distinctively when converged upon the problem of the emotional factors in thinking. The convergence comes from rather widely separated sources. Insofar as the behavior patterns that we have most to consider are those of the adult mind, it is the adult precursor in the emergent stages of mentality that has the largest illustrative value, however intimately we recognize the tendencies to revert to child-like stages of psychic growth, and their persistence. 'The Escape from the Primitive' is the happy title of a popular recognition of the theme. Confining attention to the major contributing viewpoints, one would be inclined

to give the place of precedence to the Freudian psychologists, for the reason that they included so explicitly the study of primitive phenomena as a reservoir of psychic trends. The reference is less to the inclusion of myth, custom, totem, taboo, and early cultural products as interpreted Freudian-wise than to the significant persistence of such products in the psychic deviations and aberrations. Reversion or regression acquires a double reference to the child and to the race, with the racial-cultural type the more significant for social applications. Individuals and groups have a 'racial' as well as a 'mental' age. The second group of contributors are the anthropologists who have reinstated primitive mentality as almost a division of psychology; they, too, from Tylor to Frazer, to Boas, to Levy-Bruhl focus upon the belief processes as antecedents and precursors of the logic-saturated thinking of the modern sophisticated adult; they have supplied a genealogy to an important chapter of modern psychology, portraying as an amazing reconstruction the procession of the intellectual shifts and increments in rationality. The third group are more specifically psychologists and approach the problem of thought as the rôle of the psychological infusion of feeling into the total range of logical ventures. Rignano ('The Psychology of Reasoning') offers a characteristic example; and perhaps most distinctive is the treatment of Miss Bradby in her 'Logic of the Unconscious Mind,' which incorporates the Freudian view in original manner. Nor should it be forgotten that the consummating phase of Wundt's wide span of interests in the cosmos of psychology centered in this field; he tried to write the anthopological history of homo sapiens in psychological-cultural terms. Under this combined renaissance it may be said that in the fifty-year reconstruction there has entered the definite recognition of our psychological past as a significant phase of human history, and as a clue to our present-day psyche.

Next to be emphasized in the composite reconstruction is the more intimate recognition of the organic background of the mental life. What a few decades ago was the last word in physiological psychology, and somewhat earlier was discussed

as the influence of the body on the mind—offsetting the influence of the mind on the body, which today we formulate more accurately as the psychogenic principle—barely glimpsed the present conclusions and technique through which we seek the secret of human nature and boldly apply our findings to educational and sociological policy and practice. The new insight is a brilliant tribute to the experimental method, for by no other route could we come to this convincing evidence of our psycho-palaeontological setting.

There is the psychology of respiration, from the first breath of life to the last, which awaits another Havelock Ellis to dramatize it as he has portrayed 'The Dance of Life.' The emotional shock that takes our breath away, the intimate relation of breathing to vocalization—the sigh, the sob, the catch in the voice—set the clue to the manner in which each of the great collateral vital functions is psychically represented and enters into the psychic control. These are the autonomic functions, which embody the momentous fact that we have not one but two nervous systems, of which the autonomic is in Paton's view millions of years older than the central nervous system which on the geological time-scale is our recent but enormously expanded inheritance. Ever active, like the breath of life, is the circulation, its psychic moment recognized ancient-wise in the synonym of the heart for the emotions. The mechanisms of blush and flush, of pallor and chill, the red blood of courage, the further, sometimes mystical, synonym of the blood to signify heredity, all evidence a circulatory psychology, making us as old or as young as our arteries. The psychology of digestion is more complex, for it passes over to the psychology of food, which is at once typical of the physiological hungers and the far more psychically regulated appetite. Here is the ruler of the food-cycle and the dispenser of mood, only more complexly embodied in the association of pessimism with dyspepsia, or constructively in the utilization of the after-dinner ease for philanthropy and congeniality, than in the conversion through nutrition of the fretting-because-hungry infant into a crooning herald of content. The food-need and the food-struggle along with the

caprice of appetite initiate the world of choice and control, the pattern of greed and thrift, with all its economic sequel. Most amazing in the revised version of the organic background is the story of the glands, particularly those of the internal secretions, which has raised the suspicion that instead of being masters of our fate we are glandular marionettes. In this setting the lazy become hypothyroids, and the leaders of the strenuous life become the adrenals. However tempting to the overstatements of the popularizer, the glandular psychology marks a notable advance in our comprehension of the sources of behavior and of the differentiation of character types as determined by trends of response. And all this in addition to the previously established supremacy of nerve and muscle, of feeling and movement in the mental determinism. A modern Schopenhauer would be tempted to write a book not on the 'World as Will and Idea' but on the 'World as Muscle and Nerve and Gland.'

In brief, no modern Psychology would fail to include a chapter on the organic background of the psychic life; nor are we at or near the end of the chapter. The seven ages of man are waiting to be rewritten by a psychological Shakespeare. In infancy the primitive energy cycle dominates: sleep is primary and gives way to an intermittent impulsive activity in turn inducing fatigue; there is equally the assertion of the food-cycle of hunger and satiety, and the delicate balance of function demonstrated by Cannon and others in the opposition and interplay of the several segments of the autonomic nervous system. Stage by stage comes the ripening of other instinctive urges, exploring in wider, bolder excursions as the control of hands and feet extend the psychic through the physiological maturing. Then comes play in ever growing ranges of complexity, most notably in the social complication of playing with others; in due course the emergence of the sex-feelings and the storm and stress of adolescence, the most intensive reconstruction of the individual psyche. With the partial exception of the last there is nothing new under the psychological sun after the first tremendously crowded creative and acquisitive era of early childhood, the

nature-directed, wisely busy, rush-hours of life. A child of three has done a bit of everything possible to a man of thirty; we fossilize in the Oslerian sense not at forty but at four.

This individual reconstruction that we call maturing, or more popularly growing-up, is a difficult, almost a miraculous process, especially the growth to the high-grade civilized standards of our exacting world; and what we have learned is that for most of us the achievement is most imperfectly accomplished. We do not completely escape or emerge from the childish or the primitive; our past pursues us. The problems of life, social and personal, industrial and political, cultural and recreational, are due to the strong tendency to revert to childish patterns of behavior, or retardedly never to outgrow them. The simple and obvious fact that in so many of the relations of life we have to deal with grown-up children comes with the novelty of a revelation. It is not that the leaders of men lack the wisdom to direct the enterprises of human living, but that the workable measures are limited by the too enduring legacy of childishness. Utopias have usually been projected to a past golden age or sought by 'Looking Backward'; if in a forward reconstructive mood some prophetic spokesman could portray a world of psychological adults, exercising all the priviliges of their emancipation, we should hardly recognize the picture. Yet youth is a privilege, not a penalty; and we struggle to remain young, to retain the spontaneities and enthusiasms, the play and primitive satisfactions that are bred deep in our psychic heredity; to put off the stages of decline by cultivating the ability to learn, the zest of experience, the outlook toward the future. I have projected this single picture from the many-reeled drama of the genetic life, mainly to make clear that childhood is the clue to the most authentic human behavioristic psychology; that the child is no less the teacher than the father of the man; and the racial heritage functions in like conditioning.

IV

Prominent in the reconstruction of psychology is the recognition of the abnormal and its significance as a clue to the

understanding of behavior. This derives primarily from the incorporation into psychology of the study of the varieties of mental disorder inherent in the human liability, which stands as the great menace of our psychic privileges and powers, but whose power of illumination of the intimate mechanisms of normal behavior became manifest only in the reconstructive movement that we are surveying. The abnormal, like the genetic, is a nature-made product, and thus authentic and directive; the abnormal is the normal magnified and distorted; the normal is the abnormal in miniature and under control.

Again, a single reference must suffice, but it is a most comprehensive one, thoroughly characteristic of the reconstructive temper; as is readily anticipated, the reference is to the Freudian movement. Following the method which I have adopted, I shall not present the story of the contributions and schisms of Freud and the rival schools that derive from him, but focus upon the significant principles that are prominent in the reconstructed vista, the psychic life as we—whether safely and sanely Freudian or intemperate Freudian addicts—are disposed to project it.

The position of precedence goes to the emphasis of the emotional life, as important in genetic as in abnormal psychology. The earlier psychologizing within the scientific era was pitched too high-up, on too mature a scale, was too much absorbed in adult function and the logical processes, too intellectualistic, too remote from actualities, too much given to systems, formulæ, abstractions. It failed to achieve the sense of the true proportions of the psyche through over attention to the phrene, the problem-solving rationalizing machine, a naturally favorite occupation for the psychological intelligentsia and their philosophizing tradition. The accusation or the pleasantry as suggested by the reaction from this trend that psychology first lost its soul, and then its mind, carries the truth of historical vicissitude; but he who loses his soul shall find it. In this sense the convert to the new psychology has experienced (or inherited) a change of heart and a change of mind. Intelligence is the more acces-

sible and studiable expression of the psyche, temperament and character the more vital one. In the psychic composite the emotions dominate; the reconstructed psychology gives them their rightful place. Presumably this change of front would have occurred had there been no Freud; for the psychology of instinct and urge, of satisfaction and annoyance as pivotal foci of behavior, was variously recognized, and quite as distinctly in the psychology of the glands and their intimate relations to the autonomic functions, which in one aspect is antipodal to Freudianism, as in the many-façaded structure of Freud. But his is the credit of realizing and after long years of opposition, popularizing the emotional dominance which is equally influential in placing the genetic view as an integral component of contemporary psychology.[2]

Since condensation—as illustrated in the dramatic pictorial tableaux of dreams—is one of the Freudian mechanisms, the high-points of the Freudian position may be thus condensed: (1) the recognition of the *emotional*, the *genetic*, and the *abnormal* as the joint clue to behavior, of abnormal behavior particularly, for in the actual order of discovery the abnormal came first. Freudianism was born in the psychopathic clinic, possibly an unfortunate birthplace, but such is the fact, and for long it was known only to those who had to deal professionally with the neuroses. It established (2) the *psychogenic* principle in its revised version. The fact that psychic influences could produce somatic effects was well known for ages; hysteria was recognized as a protean disorder of such origin; also that the same forces played a part in producing disease, neurotic or otherwise, that mental cures and crises were brought about by faith and suggestion, and that in this procedure the presence of trance-like states (hypnosis) might play a part. The history of the psycho-

[2] This apparent rivalry of Behaviorism and Freudianism (strictly the physiogenic and the psychogenic principle) appears strangely in the change of attitude of Watson, who in 1916 wrote congenially of the illuminating power of the wish-fulfillment, correcting and refining a Freudian concept, but, n 1926 prophesies that Freud and his tribe will presently be relegated to the unpleasant abode inhabited by charlatans and misguided empirics and other purveyors ot questionable as well as good intentions.

genic principle could be written in terms of these abnormal variations of psychic states. The Freudian version of the theme introduced novel characters and incidents and an intricately complicated plot. An enumeration of the *dramatis personæ* may serve as a synopsis of the play. There is (3) the *subconscious*, for much takes place behind the scenes and under the stage; (4) the vital consequence of *early childhood* impressions, especially (5) emotional *shocks* (psychic trauma); (6) the ever present *conflict* of instincts and urges versus the stress of fact and social pressure, leading to the opposition of (7) the world of *phantasy* or *wish* versus the world of *reality*, experience and logic gradually ousting the day-dreaming pleasures of the imagination; this introduces (8) the *censor* and the bootlegging evasion which goes on despite all the amendments of our moral constitution; (9) the *motive* and his several understudies forming (10) a caste of *determinisms*, neatly indicated in the lapses of speech and conduct, the letting the cat out of the bag of unintentional revelation, but more seriously operative in (11) *escape* from distressing situations, (12) *compensation* for shortcomings and failures, and leading to the disguises of (13) *projection*, substitution, and symbolism; then the combination of these urges and mechanisms into (14) *complexes*, highly emotionalized convictions, functioning characteristically as (15) inhibitions and *repressions*, and again in an opposite rôle (16) *fixations*, or enthusiasms and fanaticisms; next the details of the plot: (17) the leading, often intrusive, rôle of the *sex* urge which Romeos and Juliettes whatever may be the ostensible story, making much of our waking behavior and still more of our private dreams possess (18) a superficial, *manifest*, patent and a subconscious and disguised *latent* content; furthermore, the plays within the play—like the 'Mousetrap' in 'Hamlet'—such as (19) *regression*, the tendency to lapse back under strain to outgrown patterns of response, or (a different resource), (20) *rationalization* by which rich reasons are given for poor motives.

And this meagre enumeration of a score of innovations could readily be extended, for it takes no account of the

applications of the principles nor of the subsidiary mechanisms which bulk so largely in the Freudian literature and interest. The greatest of these is *psychoanalysis* which has served equally to make known and to obscure the body of doctrine of which it is the distinctive application and historically the instigator ; it gave rise to the therapeutic technique. It was considered first as a psychic purgation of confession, bringing to the surface by overcoming their resistance, the subconscious turmoils responsible for maladjustment and functional neuroses. Important as all that may be, and whatever may be the ultimate view of the value and scope of the procedure, to the psychologist Freudianism is a reconstructive system of greater consequence than this employment, and has as well other applications; such as to the anthropological deposits of myths, totems, taboos, and a mass of rites and mores; to the reading of character, and the differentiation of types of personality; to the explanation of wit and humor; to the understanding of the sources of motive and play of forces in all the social relations, from sport and recreation and fashion to industrial competition, display, reputation, rewards, honors, moralities and religions. Finally, only a brief addendum for the notable post-Freudian reconstructions: the *ego assertions* and will to power of Adler and his followers; the several contributions of Jung—the association detectors of complexes, the introvert and extrovert types of response, the elaborate, not to say fantastic, symbolisms; the love-aberrations of Stekel; the biological interpretations of Rivers, and the many contributors to the more than five-foot bookshelf of Freudian literature. Not as yet sufficiently recognized are the temperate Freudians, beginning in the psychiatrical camp with J. J. Putnam in this country, and Ernest Hart in England, and a group of younger British disciples (aroused to activity by the psychiatrical experiences of the great war), who call themselves neo-Freudians and have carried the conclusions to the discerning lay reader and to educational practice. Though essentially but a part of the reconstructive movement, these Freudians are not much exceeding their warrant in calling their position the New Psychology (Tansley). For the

Freudian concepts as well as the terminology—though in the hands of some exponents it suggests the players of golf who handle the vocabulary better than the strokes—has become the common property of modern literature, journalism, and table-talk, is in a sense the broadcasting station of the phase of reconstruction in tune with its wave-length.

V

We may place the whole of this movement with the more general one that makes the knowledge of the abnormal an indispensable equipment of the psychologist who conceives his science as dealing with the larger actualities of the human psyche, the behavior-trends and their manifold expression. In the companion panel of the picture there figures *social psychology* and its notable part in the general reconstruction. This may be the more briefly sketched as it is fairly familiar. The comment that psychology is an old science with a brief history is peculiarly true of social psychology. We may go back to the ἄνθρωπος πολίτικον ζοον ἔστι of Aristotle or the *Nihil humanum a me alienum puto* of Plautus, if we still retain a taste for classic origins; but we find it more consonant to trace its source to the post-French-revolutionary days when the rising tide of democracy focused attention upon the social organization, from Rousseau's fanciful reconstruction of a natural man, to the broadening contacts with peoples in all stages of civilization, and latterly with the intensive movement toward city life and the complications of invention, girdling the earth in a wave length.

Social psychology recognizes that human behavior is from the outset and through its course a product of reaction to one's kind. It thus becomes a differently angled cross-section of all the psychological movements that deal with total behavior in its actual setting. It takes the accredited phenomena of the mental processes and products, of the genetic unfolding, of the abnormal variations, and follows them to their social issues. For this reason it integrates closely with and its significance appears in the applications of psychology to which we now return.

VI

It becomes apparent why, though I started with *applied psychology* as a co-partner with behaviorism in the reconstruction of the last half-century, I have postponed its consideration until the factors of the movement have been surveyed. For these supply what is being and to be applied. The objects and purposes of application are naturally the occupations of men in our reconstructed world. The largest of these is *education*, the preparation of the younger generation for the obligations and privileges of the social heritage. In the present temper of youth, we can be no longer content simply with teaching the young the idea how to shoot, but how not to shoot too wildly. Yet the applied psychology of the educational processes properly looms most largely in the expansive literature which reflects the speed and dash of our large rapid-motion cities, in which the pace is set by modern ideas as definitely as by inventions, has made pedestrianism in the social as well as the physical traffic the most dangerous of sports, and threatens to give conduct a like license to break the speed-limit. I mention this danger to indicate in what important ways modernism derives from the reconstruction of our psychology. New knowledge imposes new direction, insofar as an applied psychology is inherent and tempting.

Quite rightly the central attention has been placed upon *intelligence tests*, whose prompt and popular adoption may be cited to indicate the significance of the reconstruction of psychology. Again I cannot undertake to trace the history of the movement, but to envisage the underlying principles. The most general requirement in applied psychology was a standard of measurement of capacity; the I. Q. has become as familiar as a foot-rule, and there is danger that it will be thus regarded. The attention thus directed to the nature—the analysis as well as the function—of intelligence is most helpful; it requires the recognition of all the components of the human endowment; and that means, as has been indicated, first, analysis, and second the reference to the natural biological setting (and more and more to the artificial em-

ployment) of each factor of mentality. To the logical behaviorist intelligence is an abstraction, for it is never exercised without the collateral supporting processes, which are characteristically emotional. For whatever we do, we must have the urge, the interest, the curiosity, the patience, the desire to do it; these can neither be neglected nor commanded. These also are moral qualities, subject to the regulation of desire in the medium of duty. We need not endorse the opinion of the sophomore conditioned (in the academic not the behavioristic sense) in mathematics, that he always regarded algebra as a low order of cunning, to appreciate that we are always measuring capacity for effort as well as ability. The fallacy has been forcibly pointed out by Boas in the study of primitive mentality, that regards the 'savage' as limited in intelligence because his interests are directed quite differently from ours; the things that stimulate us are indifferent to him, and vice versa. Of equal moment is the conspicuous fact—despite or along with the recognition of general intelligence—that adepts in one phase of performance are dullards in another. Some of us would object to have our status rated by our musical ability, others by ability as artists in line or color or form; still others if the accepted standard were ability at chess-playing, and yet others if it were shrewdness in selling, or in political management. Yet these are all parts of endowment or of its application, involving intelligence. Still more complicated in consideration is the *quality* of performance, which derives from the nature of our make-up, temperament and character, the most intimate but elusive of all conditioning factors. It appears in one important aspect as our normality or departure from it, not in the quantitative scale more easily measured, but in the complex standard of quality, a very different dimension. To put it a little too pointedly: in addition to the I.Q. the intelligence quotient, there is also the Q.I. the queerness index, the departure from the usual, responsible for maladjustment and eccentricity, for genius and psychopathic failure alike. Stated from a different approach there is an emotional age as well as a mental age, not so easily determined but enormously signifi-

cant. Nor has this been neglected in our reconstructive efforts; will-temperament tests, and tests of nervous instability or control, as well as indications of neurotic trends are now carefully considered, and importantly modify the combined rating of the individual.

By virtue of its popular appeal, it behooves applied psychology to develop a wise perspective of importance and significance; it cannot accept the direction from an alien field, such as the commercial valuation. The importance of the *psychology of advertising* is not to be measured by the money spent upon it; it has in itself a very limited interest. There is no desire to be pedantic and rule it out, but buying and selling are not predominant or original or pervasive psychic activities, by reason of the volume of energy and stimulated interest which these pursuits absorb, but absorb only in the setting of our kind of living. It is obvious that this consideration cannot be neglected, especially in its instrumental aspect. Certainly we shall study intensively the specialized processes of reading, writing, and arithmetic, because these are to us the indispensable instruments of the mental life as we live it, the available route to the life of ideas, and the access to literature and science. The same applies in due measure to any of the indispensable techniques with which we must become familiar because of our setting, but which would be very differently distributed in the life of an Esquimaux or a Hottentot.

The principle of *valuation* in applied psychology must be closely scrutinized. It is not what is measureable that is important, but it is important to devise modes of measuring what is intrinsically important, in the first reference to the mental life as biologically and sociologically conditioned, next to the specific conditioning of our enforced artificial employment. It is legitimate that the shading and perspective of our psychology shall reflect this extraneous interest; but it must not dictate to or encroach upon the development of the psychology in its own right and as a scientific pursuit. In this perspective the great fields of applied psychology are (1) the *educational* so closely integrated with the genetic process and

(2) the *therapeutic*, so intimately dependent upon the abnormal. Here lie the arts always dependent upon the science, the practice on the theory: the skill derived from a knowledge or a flair for the direction of the psychological process of unfoldment, the genius of teaching, and the clinical skill in correcting the ills that flesh and mind, emotions, character, will and intelligence are heir too—the genius of healing. Hence the supremacy of educational psychology in the broad interpretation and of therapeutic psychology, now duly recognized in the most recent reconstructive movement, *mental hygiene*.

We may concede to *industrial psychology* the next place in rank, but again distinguish between those problems that have a *directive* and those which have a *subsidiary* significance. The personnel problem is one of large dimensions, fitting the job to the man as well as finding the man for the job; for the right solution is not only of great economic significance—a secondary consideration for the psychologist—but in reaching a solution we must consider in expert psychological temper the most complex phases of human nature, and appraise the total individual in the intelligence scale of capacity, the emotional scale of satisfaction, the moral scale of ideals. Compared to this, advertising and salesmanship are merely technical specialties. Their minute consideration may be warranted by our enforced interests, perhaps fortunately, perhaps unfortunately, just as the large number of dentists does not indicate the care of the teeth as the highest ends of existence, but as an imposed necessity by reason of anatomical weakness. Life would be better off without so much extracting of teeth from unwilling patients and of money from unwilling buyers.

What should be made plain is that the economic man is an abstraction, and the only real man is the psychological one, who perforce must spend some part, a large part for most of us, of his energies in a way that has economic significance; but that significance derives from human needs and their satisfaction. *Industrial psychology* is then a *practical* phase of *social psychology*, a specialized application. Human constructiveness is real, and invention its important product; but in the sense in which poets are born, patent lawyers and railroad engineers

are not. The human endowment plus the stress of circumstance can make these careers, and make men find satisfaction in their pursuit; but over and above stand the generic relations of social competition, success and failure, prides, shames, display, honor, reputation, and the imponderables that condition employment. All we can do is to put the same ancient endowment to new uses, and throw into new relations persistent activities of our intellectual, emotional, and social nature. With the bare mention of these clues—and they have been wisely followed by the most discerning of the social psychologists, Allport, Bernard, Dunlap, Gault, McDougall, though too commonly neglected in a confusion of technical, sociological, and psycho-social interest—I must leave the completion of the sketch in the developed portrait of the modern composition which has brought into such central prominence our social psychology.

VII

I have thus come by a round-about road to the end of my route, admittedly eclectic and furnishing but typical glimpses along a highway still largely in the making. I have sought to indicate the temper and trend, the origin, bearing and prospective employment of the several movements conspicuous in the reconstruction of psychology. It is fitting that some tribute be offered to the place of Johns Hopkins University in this development. It is a large one. Though James at Harvard gave psychology prestige and inaugurated laboratory approaches, and Ladd at Yale offered the first text embodying the newer movements, Johns Hopkins gave a distinctive standing by founding a professorship—and at a venturesome period a Journal—that established the training of psychologists as an accredited part of the scientific profession. This establishment was created in the five years of G. Stanley Hall's Baltimore professorate. It was due to the extraordinary grasp, energy, interests, and interpretative ability of an extraordinary man. He was encyclopedic in temper as well as in learning, and compassed larger areas of knowledge than any later intellect of his type can hope to master. He be-

lieved and practised broad foundations in experience as well as knowledge. His outlook was ever forward, as is that of a reformer and a pioneer. The chapter in his 'Life and Confessions' sketching the progress of psychology as he had witnessed and lived it, is a notable document. His influence endures. It is fitting that the large company of psychologists who owe their inspiration and training in this career to his leadership—and among these I am gratefully enrolled—should pay tribute to his memorable contributions to the reconstruction of psychology, by dedicating this session to the revered memory of G. Stanley Hall.

THE DEVELOPMENT OF ANIMAL PSYCHOLOGY IN THE UNITED STATES DURING THE PAST THREE DECADES

BY C. J. WARDEN AND L. H. WARNER

Columbia University, New York University

The experimental movement in animal psychology in the United States appears to date from the pioneer studies of Thorndike which began to attract general notice about three decades ago. It is a matter of common knowledge that the interest in laboratory studies of infra-human organisms thus initiated has shown an unprecedented growth in connection with the development of psychology in America. However, so far as we know, no attempt has been made to gather the actual statistical data upon which an adequate notion concerning the extent of this growth might be based.

The purpose of the present study was to secure the needed facts concerning this development during the period under review in connection with a larger historical treatment of comparative psychology.[1] An attempt has been made to gather together the main facts, insofar as these are at present available, concerning the early beginnings of instruction and research in this field with the hope that these would prove of some interest to the present-day worker. More detailed and systematic information concerning the present status of the activity in this field has been secured.

The first method employed was that of sending a questionnaire (see plate I.) to one hundred American colleges and universities selected with reference to the liklihood that animal psychology would be represented by special courses or research laboratories. Although the questionnaire was somewhat long and detailed, 72 of the 100 institutions sent

[1] See Warden, C. J., 'The Historical Development of Comparative Psychology,' PSYCHOL. REV., 1927, 34, pp. 57–85, 135–168, or 'A Short Outline of Comparative Psychology,' New Science Series, Norton, N. Y., 1927.

back a reply to it. Naturally the facts concerning the early beginnings of the work in a given institution were not readily obtainable by the present departmental staff in many instances and only approximate dates, etc., could be given. This together with frequent omissions left much to be desired in the matter of getting an accurate picture of the early work especially.

It was therefore decided to make use of a second source of information—the catalogs and bulletins of the various institutions. This part of the investigation was carried out by the junior author and involved much arduous searching among catalog files, often incomplete. Full use was made of the catalog service of the New York Public Library, the Carnegie Foundation of New York, and the Teachers' College Library—the three together offering, perhaps, the most complete collection of such material in the country.

Of the 72 institutions returning questionnaires 32 had indicated that they did not now have, and had never had special courses or research laboratories in animal psychology. Each of the remaining 40 was included in the catalog check along with the 28 that had not replied to the questionnaire. Some 20 other institutions were added to the original list of 100 and these were also included in this catalog check. Since a few of this latter group were found to have recently added animal psychology to the curriculum we cannot be certain that we have not omitted from the lists presented in our tables a few of the smaller colleges which have recently installed such courses and which would have been discovered in a wider survey. The catalog service was, of course, less satisfactory for the smaller colleges.

The information here reported is a combination of the data gathered by means of the questionnaire and that secured from the catalog check. When questionnaire and catalog have not agreed we have used our best judgment, giving the former the greater credence when the report in general showed care in preparation and detail in content. In fact the catalog check served mainly to fill in omissions and to

corroborate, although in certain instances it led to important corrections of the questionnaire results. When a given point was not covered in the returns from either source, and could not be secured by personal correspondence with individuals who might be supposed to know the facts, a blank has been indicated in the tables.

Before discussing the results of this survey, attention should be called to several important limitations that otherwise might pass unnoticed. In the first place we have restricted the scope of the survey to animal study as represented by instruction and research carried on by departments of psychology in the United States. No account has been taken of the large amount of animal work, both instructional and research, that has developed during the period under review in connection with departments of zoölogy and physiology in American colleges and universities. This omission carries no implication whatsoever concerning our estimate of the relative importance of the contribution of psychologist vs. zoölogist and physiologist to the modern experimental movement in this field; our primary interest at the moment was to find out what the psychologists had done and are now doing, and this accounts for the fact that the survey was restricted to this group.

This report does not pretend to represent the entire interest and activity of psychologists in the infra-human field. We have already pointed out that a few of the smaller colleges that have more recently installed animal work may have escaped our notice. Furthermore, we have omitted from our list in practically all cases courses in genetic psychology. This type of course was not uncommon even earlier than three decades ago and in most cases should not be considered as an outgrowth of the modern experimental movement in the animal field. It was usually a combination of animal and child psychology—it might be almost wholly the one or the other—and in some cases included abnormal, race and other such topics. So seldom was it an adequate systematic survey of the known facts concerning the behavior of infra-human organisms, and therefore so seldom identical

with what we now mean by the term animal psychology, that we have not included such courses under the term animal psychology. A few exceptions were made when the catalog description clearly indicated that an entire semester was devoted to a phyletic survey, the child psychology or other topics being given the other semester of the course. Our justification for this restriction lay partly in the fact that we had made no provision in the questionnaire for reporting data concerning genetic psychology courses. Doubtless many institutions reporting no animal work at all did have, or had had at some time, a course in genetic psychology. It seemed the fair thing under the circumstances to throw out the few instances in which 'genetic' had been reported as animal (except as above noted) and to include only straightforward animal courses in our list. This does not mean that we have failed to recognize the close relation between genetic psychology courses and the movement under review.

In like manner we have omitted courses which include merely a short series of lectures on animal psychology (often as many as six or more) but are primarily either one-year courses in general psychology, or educational psychology or topical courses for more advanced students. In brief, every institution listed in Table I. offers or has offered a course in 'animal psychology,' 'comparative psychology,' or 'animal behavior' which so far as we can determine the matter was such in fact as well as in name.

The term 'organized laboratory' or 'research laboratory' naturally had to be restricted also in order to have any meaning. Our intent was to determine what departments of psychology had given such prominence to animal research as to provide special rooms for this work. As a matter of fact most human psychological laboratories in America have sponsored an occasional study on some animal form. We have included in our list (Table II.) only those institutions that have at some time or another provided rooms and equipment designed to be used regularly for animal research, or have had a man on the staff to care for the research in

TABLE I

COURSES IN COMPARATIVE PSYCHOLOGY

Institution	Earliest Course		Present Course			
	Date	Offered by	Hrs. Lect.	Hrs. Lab.	Enrolment	Graduate, Undergraduate or Both
Barnard	1923	G. S. Gates	36	0	18	U
Bryn Mawr	1912	J. H. Leuba	45	0	21	U
[2] California U.	1918	E. C. Tolman	36	108	—	B
Catholic U of Am.	1925	C. J. Connolly	36	0	—	B
[2] Chicago U.	1899	G. H. Mead	36	72	26	B
Clark U.	1899	E. C. Sanford	36	36	9	B
Colorado U.	1910	L. W. Cole	54	0	80	U
[2] Columbia U.	1924	C. J. Warden	72	72	12	G
Cornell U.	1909	I. M. Bentley	Dropped			
Drake U.	1906	Florence Richardson	Dropped			
Emory U.	1918	H. W. Martin	—	—	—	—
Geo. Washington U.	1925	Wm. Middleton	54	0	35	B
[1] Harvard U.	1902	R. M. Yerkes	54	0	—	B
[1] Idaho U.	1916	H. B. Reed	54	0	—	U
Illinois U.	1913	I. M. Bentley	36	108	10	B
Indiana U.	1910	M. E. Haggerty	Dropped			
Iowa U.	1902	M. C. Williams	Dropped			
Johns Hopkins U.	1908	J. B. Watson	Dropped			
Kansas U.	1912	F. C. Dockeray	36	36	8	B
[3] Michigan U.	1909	J. F. Shepard	36	0	—	B
Minnesota U.	1915	Jos. Peterson	36	210	9	B
Mt. Holyoke	1906	S. P. Hayes	Dropped			
New Mexico U.	1925	B. F. Haught	54	0	—	—
[2] New York U.	1924	P. D. Stout	54	36	40	U
No. Carolina U.	1920	J. F. Dashiell	54	36	4	B
Oberlin	1910	R. H. Stetson	54	0	20	B
[1] Ohio State U.	1907	T. H. Haines	72	0	9	B
Ohio Wesleyan U.	1921	E. B. Skaggs	36	18	6	B
Oklahoma U.	1907	L. W. Cole	54	54	11	B
Pittsburgh U.	1912	J. H. White	Dropped			
[1] Radcliffe	1913	R. M. Yerkes	54	0	—	U
Smith	1918	Ruth Clark	30	18	26	B
Southern Calif. U.	1921	K. T. Waugh	—	—	—	—
[3] Stanford	1916	J. E. DeCamp	36	0	21	U
Texas U.	1908	C. S. Yoakum	Dropped			
Vassar	1918	M. F. Washburn	54	0	6	U
Washington State Col.	1922	C. I. Erickson	36	0	7	B
Washington U. (Seattle)	1913	Stevenson Smith	36	0	42	B
Wisconsin U.	1911	Joseph Jastrow	36	—	45	B

[1] Irregular, usually in alternate years.

[2] Course offered in summer session also.

[3] Offer an additional laboratory course.

this field or in some other manner sponsored more or less regular research. Here again the judgment of the writers has entered into the interpretation of the data.

TABLE II

RESEARCH LABORATORIES

Institution	Earliest Laboratory		Present Laboratory	
	Date	Directed by	Rooms	Square Feet
California U.	1918	E. S. Tolman	6	—
Chicago U.	1903	J. B. Watson	9	—
Clark U.	1899	E. C. Sanford	5	810
Colorado U.	1910	L. W. Cole	2	100
[1] Columbia U.	1924	C. J. Warden	4	1,200
Cornell U.	1909	I. M. Bentley	Dropped	
Harvard U.	1899	R. M. Yerkes	—	—
Illinois U.	1913	I. M. Bentley	2	2,400
Johns Hopkins U.	1908	J. B. Watson	Dropped	
Kansas U.	1912	J. C. Dockeray	2	1,600
Michigan U.	1909	J. F. Shepard	6	—
Minnesota U.	1917	K. S. Lashley	8	1,600
New York U.	1926	L. H. Warner	1	—
N. Carolina U.	1920	J. F. Dashiell	1	200
Onio State U.	1926	H. E. Burtt	2	800
Ohio Wesleyan U.	1921	E. B. Skaggs	2	125
Princeton U.	1925	H. S. Langfeld	3	500
Smith	1924	M. Wooster	1	—
[1] Stanford U.	1916	J. E. DeCamp	1	1,500
Texas U.	1908	C. S. Yoakum	Dropped	
Washington U. (Seattle)	1913	Stevenson Smith	2	300
Wisconsin U.	1923	C. J. Warden	9	2,000
[2] Yale U.	1923	J. E. Anderson	3	700

As a matter of convenience the data are presented in two tables, the one covering the instructional and the other the research aspects of the topic. The dates used are always the first of the pair designating the college year in question; that is, 1922 indicates that the course was offered, or the laboratory established in the school year 1922–23, regardless of whether the first or second semester were intended. Institutions which have more or less distinct faculties even when organically united are given separate representation. Thus

[1] Research course offered in addition to regular laboratory work and individual research.

[2] In addition, both course work and research are now carried on at the Institute of Psychology at Yale under the direction of Prof. Yerkes.

for example Harvard and Radcliffe are listed separately; likewise Columbia, Barnard, and Teachers College.

The data of Table I. require little comment. The first section refers to the earliest course offered in this subject in the institutions listed. It is difficult to give proper credit for the introduction of the subject into the curriculum of a given institution. In many cases the credit belongs to no one person since it may have been brought about by the interest and coöperation of several members of the departmental staff. Question 5 was not answered in many instances. We decided to omit all names supplied in question 5 therefore and give only the name of the person who first offered the course (question 2), without meaning thereby to assign full credit to such person in initiating the work in the department concerned. More detailed data regarding these early courses are omitted since the description in the earlier catalogs are not very complete in many cases. Usually they were either 2 or 3 hours and for one semester, or quarter only. The laboratory work in connection with the course, if any, was most often merely class demonstration and did not involve a systematic treatment of experimental technique.

Of the 39 institutions listed as having had animal courses at some time during this period 31 are now offering at least one course. In several instances a full year with laboratory is given; in others the course is repeated in the second semester or during the summer session; in still others a laboratory course is offered in addition to the general survey. Apparently Clark and Chicago universities were the first to introduce courses (both 1899) with Harvard as a close third (1902). It is noteworthy that some 14 of the institutions listed have introduced courses since the world war. Surveying the period as a whole it appears that the growth in instructional work in this subject has been a fairly steady and healthful one from the first.

The information gathered concerning the present course (when given) is presented in the last 4 columns of the table. The value in the first of these columns indicates the total

number of lectures delivered; it was obtained by multiplying the number of lectures per week by 12 if quarter system, or by 18 if semester schedule operated at the institution in question. Laboratory hours were likewise reduced to a common index term; the values given represent the total number of hours actually spent in the laboratory. Some 12 courses at least appear to include regular laboratory instruction. The enrolment recorded is an average of that of the past two years (1924–5 and 1925–6); in a few instances such data were not supplied. The type of student taking the course is shown in the last column: U, undergraduate; G, graduate; B, both graduate and undergraduate. The total enrolment is only little less than 500 students.

Information concerning the early establishment of research laboratories is given in the first section of Table II. We have credited the establishment of the laboratory to the person who was in direct charge of the first laboratory as indicated in the replies to question 1, although other members of the staff may have been in part responsible. Some 23 institutions are listed as having fostered a research laboratory at some time and at least 19 of these are active at the present time. Some idea as to the physical equipment and facilities for research can be had from the values of the last two columns. In many cases the fact was indicated that additional space in the human or biological laboratory of the institution was available when needed. Nor must we forget that a large number of departments—perhaps a score or more—sponsor occasional animal research in the general laboratory; the above list therefore does not represent by any means the whole of the research interest in this field. Naturally the quality and amount of research actually done would be the most adequate index of the importance of a laboratory but a rating of this sort is obviously impossible to obtain. It should be noted that courses have seldom been dropped in institutions that have made provision for supplemental laboratory and research work.

The first regularly organized laboratories were established, it would appear, at Clark and Harvard (both 1899) with

Chicago a close third (1903). Some 9 of the 22 laboratories listed have been set up since the world war.

On the whole comparative psychology has made a very satisfactory beginning as an experimental science during the past three decades in our American universities. Although the movement was retarded on account of the world war it has not only fully recovered since but has scored new advances. The renewed vigor of the post-war period speaks well for the immediate future at any rate. Developments in experimental methodology and in the steady accumulation of facts concerning the life and behavior of infra-human organisms are highly encouraging. The effect of the relatively important place accorded to comparative psychology in America during the period under review has been reflected in an increasing tendency toward a broadly biological viewpoint in general psychological theory.

PLATE I.—The Questionnaire

EARLY DEVELOPMENT

1. Has Animal Psychology ever been represented in the department by classroom instruction....., an organized laboratory....., or (if no laboratory) by occasional research.....?

2. The earliest course in this subject was offered in.....(give year) by.....(name of instructor).

3. The earliest animal laboratory was organized in.....(give year) by.....(name of person in charge).

4. The earliest research (animal) was conducted in.....(give year) by.....(name of experimenter) and was published under the following title.....

5. Give the names of anyone (not mentioned above) who aided in the early introduction of animal work into the department.

6. Give any other pertinent information on the reverse side of this blank.

PRESENT STATUS

7. Is Animal Psychology represented in the department at the present time by classroom instruction....., an organized laboratory....., or (if no laboratory) by occasional research.....?

8. The course (if any) as now offered includes.....hours laboratory per week and.....lectures for.....semesters. It is restricted to undergraduates, graduates, or is open to both..... It had an enrolment in 1924–25 of....., and in 1925–26 of..... students and was offered by.....

9. The laboratory (if any) consists of.....rooms, aggregating approximately.....sq. ft. of floor space and is under the direction of.....

10. We have no animal laboratory at present, but an occasional research in this field is carried out in connection with the general departmental laboratory....., other departments of the university....., other institutions in the community.....

THEORIES OF AFFECTION AND ÆSTHETICS OF VISUAL FORM

BY C. O. WEBER

Wells College

I. Introductory

In the ever-turbulent field of psychology, an eclectic view deserves especial attention. H. T. Moore's theory of consonance,[1] we believe, belongs in this laudable category. It is really a 'psychological' theory, like that of Lipps, without the latter's unhappy obscurantism; and is an empirically verifiable theory, like the theory of Helmholtz, or Kreuger, or Stumpf. We have had occasion to demonstrate its empiricism, and its validity as well, in the sphere, not of audition, but with the visual perception of forms.

In the present paper, after stating the Moore theory, we wish to give the procedure and results of our experimental test of it. Then, we wish to exhibit the potent manner in which this theory embodies the basic contentions of such various students of the psychology of the æsthetic as Lipps, Langfeld, Bullough, Groos, Sully, and Troland (on the neurology of affection). Thirdly, and most remarkable of all, we present this theory as a solvent for many predicaments which surround æsthetics in its philosophical aspects. It is peculiarly fitted to harmonize apparently diverse views: the view of H. B. Alexander[2] and of I. G. Campbell[3] that beauty is in the object versus the view of Kant[4] that beauty is subjective, the view of Langfeld that any object can be an æsthetic object as against Hegel's desire to confine it to

[1] Moore, H. T., 'The Genetic Aspect of Consonance and Dissonance,' Psychol. Monog., 1914, 17, No. 73.

[2] Alexander, H. B., 'Nature and Human Nature,' 1923, p. 238.

[3] Campbell, I. G., in a Paper read before the Sixth International Congress of Philosophy.

[4] Sully, J., 'Æsthetics,' *Ency. Brit.*, 1911, 1, pp. 277 *ff.*

vision and hearing;[5] the emphasis of Hobbes and Guyau[6] on the biological and social value of æsthetic experience as against the contention of most writers that the æsthetic experience is 'disinterested.' Moreover, this theory exhibits an important rôle which the *Gestalt* treatment of perception can play in æsthetics. To add more were to risk the loss of the reader's last shred of confidence!

II. Moore's Genetic Theory of Affection

H. T. Moore first developed his theory in connection with an experimental study of the perception of tonal consonance;[7] but has since extended it to spheres of affectivity other than music in his 'Pain and Pleasure.'[8] In the former work he writes," Consonance and dissonance have to do directly with the degree to which an individual is able to synthesize two tonal elements into a unified complex; this synthesis is unaffected by analysis, and the individual's ability to analyse is unaffected by synthesis. . . . It is the barely successful synthesis, in which the individual accomplishes with difficulty the unification of a manifold, that he finds the keenest pleasure."[9]

In his 'Pain and Pleasure' Moore extends this principle to all sorts of pleasurable appreciations. Art consists in a 'unity in variety,' but people differ in the amount of variety they can unify. The pleasurable is that which is difficult, but not too difficult. In the perceptual sphere, the history of music especially shows that every great musician outraged public views on harmony—but becomes classic by inducing them, in time, to find synthesis in his dissonances. This theory can be extended easily to the motor sphere: it explains why habitual actions become affectively neutral, why building a bonfire is pleasant, though less strenuous 'duties' are un-

[5] Reference to Hegel in Sully's article, p. 280. Specific references to Langfeld to follow.

[6] Sully's article, *cf.* Hobbes, 'Human Nature,' Ch. 8, Par. 5.

[7] In the Psychol. Monog. article cited.

[8] Moore, H. T., 'Pain and Pleasure,' N. Y., 1917.

[9] Moore, H. T., Psychol. Monog., 1914, 17, p. 19.

pleasant, how (as Poincaré stoutly insists) [10] a scientific law is an artistic creation. Newton's law is beautiful because its simplicity embraces a wide variety of bodily movements: its beauty is vaster to those who see (though this is a more difficult apprehension) that Newton's law embraces not only movements but other laws of motion.

By this time, the doubts of the critical reader have multiplied. What is this 'synthesis' which gives pleasure, except a verbal baptism for a difficulty? Is it *fusion* as in Stumpf's usage? Moore warns us against this identification. By 'synthesis' I mean simply a kind of fusion that is wholly independent of analysability. Synthesis brings about a 'unified complex'; *i.e.*, it is *a unification in which numerical elements may persist.* This unification has two conditions: (1) the difficulty offered by the stimulus, and (2) the synthetic powers of the subject, having two components, native ability and the effects of practice. For the time being, let us accept the observer's judgment 'agreeable' as a sign that 'something is present' which conditions this judgment, and we will tentatively call this 'something,' *synthesis.* We are at least prepared to gather empirical data, and can leave to the logical portions of our paper the question of the propriety of calling 'synthesis' the basic prerequisite of agreeableness, and the problem of defining what synthesis is.

III. Moore's Theory of Affection and Visual Forms

Moore finds in the history of music [11] clear evidence of the fact that musical education can convert dissonance to consonance. In his 'Pain and Pleasure,' he exhibits the operation of this principle in the history of painting and literature, as well as in the more trivial play-life of man. More significant still is his experiment, conducted with the coöperation of Münsterberg and Langfeld, on the effects of habituation on the affective quality of two consonant intervals and on

[10] Poincaré, H., 'Science and Method' in his 'Foundations of Science,' N. Y., 1921.

[11] Psychol. Monog., 1914, 17, Ch. 4.

two dissonant intervals.[12] Habituation was secured by the methods of prolonging and repeating these sounds. The results [13] indicate clearly that practice causes the two dissonances to become more nearly consonant, while the consonant intervals lose their consonant quality with practice. Moore, therefore, stresses this factor of practice, though his curves indicate individual differences in the rates of rise or fall in consonant quality. He infers that a rise in the consonance of dissonant intervals points to increasing synthetic power in the subject, due to practice. The loss of affective value for consonant intervals is inferred as due to synthetic activity which has become so easy that it is affectively neutral.

In our verification of this theory in the sphere of visual form, we aimed to bring out especially (1) the empirical reasons for regarding agreeableness as founded on synthetic perceptual power, and (2) to exhibit the fact that such powers of synthesis show individual differences which parallel individual judgments of 'pleasant' and 'unpleasant.' The fact that extremely simple visual forms, such as simple squares or circles, are affectively neutral, neither 'agreeable' nor 'disagreeable,' already supports the view that affective neutrality is correlated with excessive simplicity.

We required a series of designs, varying from one so simple that it would be affectively neutral for most observers, to one so complex that it would be unpleasant for most observers. We do not imagine that the complexity of the material is the only factor of agreeableness—there is also the subject matter of the design, which may evoke feelings of pleasure or displeasure, irrespective of the complexity of their presentation. Therefore, we required a series of designs in which the same basic form (corresponding to 'motif' in musical composition) always reappears, varying in complexity.

We are indebted to Lightner Witmer's resourceful laboratory manual [14] for a suitable figure. We selected for our

[12] *Idem*, Ch. 5.

[13] Detailed results stated on pp. 57–59.

[14] Witmer, L., 'Analytical Psychology,' 1902.

simplest design a cross from the church of St. Sophie (Chart 25, Fig. *e*, p. 79). Another figure (Chart 26, Fig. *a*, p. 81) is no more than the St. Sophie figure complicated by splitting the cross extensions. We constructed intermediate forms, and made the perception of the form of the cross difficult by gradually forming two adjacent arms of the cross into a shield device. We thus secured seven figures in all, of which number 7 is the most complex.

For a second experiment of 'applied' character, we selected ten pairs of coverlet designs [15] so that each pair would have as much as possible the same formal motif, but would differ in complexity.

But now, how secure the index of perceptual power of our subjects? We wished to measure that dynamic element in perception which the older psychologists called 'apperception,' which McDougall calls 'perceptual thinking,' which the *Gestalt* psychologists regard as the mental activity which separates a 'figure' from its 'ground.' Perception is not a passive or photographic process. The eye, as Binet held, 'carves' its objects out of the stuff of reality. For order to exist in the object is one thing, for mind to find that order is quite another: only the latter is perception. Many of the 'figure-ground configurations,' as Werner declares,[16] are 'poly-figurations.' That is, figure may become ground and ground may become figure. This fact is not explained by physical laws, since the object always remains the same—it is explained by activity of perception. The object supplies only the 'stuff' for this labor. There are two ways in which this dynamism of perception can be studied: (1) by observing the manner in which perception *derives* a figure out of a complex ground which can yield it, and (2) by observing the manner in which perception *supplies* a figure to a ground which is too incomplete to yield it. In our experiments, we chose to measure apperceptive power by the latter method, and took for materials the Heilbronner cards.[17] We assumed that the

[15] Hall, E. C., 'Book of Hand-Woven Coverlets,' Boston, 1914.

[16] Helson, H., 'Psychology of Gestalt,' *Amer. J. Psychol.*, 1925, 36, p. 497.

[17] Consists of a series of cards representing various objects in various stages of completion.

ability of the subject to supply the missing parts of an incomplete design, so that he 'guesses in advance what it is going to be,' is a direct measure of perceptual power. Since all of these figures are of banal familiarity, the factor of acquaintance is very nearly eliminated.[18] We have on record the performances of our subjects with the Coöperative Intelligence Tests and average records of college grades for the last year.

The subjects for these tests consisted of two groups; the first, a group of 62 psychology students from last year; and the present class of 48 students form the second group. The seven figures of the cross (which from now on we call the 'complexity preference series') were presented by the standard method of paired comparisons, the student selecting the 'more agreeable' member of each pair. The score for this test (degree of complexity preferred) was located at the figure (1 to 7) which was preferred most frequently. If two adjacent figures were equally preferred, the point between them was taken as the index; this gives us 13 degrees of complexity preference in all. The ten pairs of coverlet designs were similarly judged, and the score was the frequency with which the complex figure was preferred. The above tests were given in group form, the figures being flashed for 5 seconds on a screen. The Heilbronner cards were flashed on the screen about 4 seconds each. The scoring in their case is obvious. The score made in this test we call the 'apperception score.'

In Table I. we present the correlations and P.E.'s obtained with the 1925 group, and in Table II. the equivalent data for the 1926 group.

TABLE I

Factors Correlated	Cases	*r*	P.E.
1. Apperception score—Complexity Pref.	62	plus .392	± .072
2. Apperception score—Coverlet Designs	62	+ .106	± .075
3. College Grades—Complexity Preference	45	+ .103	± .089
4. Intelligence—Complexity Preference	45	+ .114	± .087

[18] We did not use the 'fireplace' figure: it is ambiguous.

TABLE II

Factors Correlated	Cases	r	P.E.
1. Apperception Score—Complexity Pref.	48	+ .412	± .080
2. Apperception Score—Coverlet Designs	47	+ .087	± .097
3. College Grades—Complexity Preference	46	+ .186	± .064
4. Intelligence—Complexity Preference	47	+ .203	± .057

That the students with high apperceptive powers prefer the more complex figures seems obvious from the (almost equal) correlations for both groups (+ .392 and + .412). The author has little doubt but that the actual dependence of preference on apperception is much higher than is indicated by the above figures.[19] That college grades and intelligence should correlate positively with complexity preference is to be expected. The student with high apperceptive powers can attack intellectual problems with greater ease, since these come mainly *via* perception.

IV. ORIENTATION OF PSYCHO-ÆSTHETIC THEORIES

Moore's examination of Stumpf's fusion theory of consonance enabled him to avoid a basic confusion in that savant's thinking. Stumpf[20] insisted that the fusion of tones did not mean the disappearance of analysis. On the contrary, fusion is only distinctly present after analysis has taken place. Yet he measures the various fusion grades according to the difficulty of analysis—an apparent inconsistency.[21] Now, Moore distinguishes two kinds of unity, the numerical unity of the chord as against its qualitative unity. There is no inconsistency between the idea of a

[19] Our hand-drawn series of 7 crosses are far from ideal material for a test of complexity preference. Figure 7 especially contains elements which make it different from the others in kind. As for the Heilbronner cards, success with them involves too much the subject's clarity of visual imagery, the rôle of memory, and recency of experience with the objects portrayed. As for the coverlet designs, the paired figures barely resembled each other, so that preference for a *kind* of figure constantly upset the factor of complexity preference. Nevertheless, complexity makes itself felt throughout.

[20] Stumpf, C., 'Konsonanz und Dissonanz,' p. 37.

[21] Moore, H. T., PSYCHOL. MONOG., 1914, 17, p. 12. *Cf.* Stumpf, C., 'Tonpsychologie,' 11, 142 *ff.*; and 'Konsonanz und Dissonanz,' 36, 37.

numerical unity which vanishes with analysis and the idea of a qualitative unity which remains after numerical analysis. A consonant chord is a 'unified complex,'[22] *i.e.*, a unity in which complexity persists.

The *Gestalt* school of psychologists maintain that the psychology of perception is vitiated by our analytic habits of understanding. We imagine perception to be a cumbersome process of numerical analysis of the perceptual field into its parts, followed by a resynthesis. The truth is, they insist, that perception involves the emergence of a figure on a ground, association and dissociation occur together, as it were. Not only this, but the figure is more than a sum of parts. Nevertheless, they admit that some observers exhibit a genuine analytic type of perception,[23] thus acknowledging that two types of perception exist. The sort of perception which Moore makes the medium of consonance and dissonance (it seems to me) is clearly of the 'figure-ground' type. If perception indeed exists in these two forms, the view at once suggests itself that *analytic perception* is of the sort which typically leads to action. The figure-ground type of perception, on the contrary, belongs to the attitude, not of action, but of contemplation: it is the sort of perception which supplies reflection, not action. It is surely the type of perception which must figure in all æsthetic contemplation. Suppose that an observer is actively interested in entering a building; his perception must be analytic, for he must single out the door as the object of his attention. Even more analytic is that root of all action, the conditioned reflex, which, like a scalpel, singles out single sensations or perhaps even their isolated attributes, to which to respond. On the other hand, everyone has observed how much like a picture a busy thoroughfare appears when seen from a high window. The window frame, like the frame of a picture, delimits a space into which we cannot bodily enter. Our perception now mimics reason, it becomes contemplative, seeking in its

[22] *Op. cit.*, p. 18.
[23] Helson, H., *op. cit.*, p. 346.

object some whole unity without a loss of parts. A figure-ground perception is the result.

It is not that in figure-ground contemplation there is no bodily attitude towards an object. The contemplative attitude is only one in which bodily response is distantly postponed in time, but this removal of actual response to a problematical future enables the *whole* of the organism to adjust to the *whole* of its object. Bullough clearly recognizes this in what he calls 'psychical distance' as a factor in art and as an æsthetic principle.[24] Immediate actions can (roughly) occur only one at a time, and perception suited to such action must be selective and analytic.

Now, this seems to be the essence of Lipps' 'Einfuhlung' theory. Lotze had distinguished two forms of adjustment: the one *towards* an object, the other *in* the object. It is the latter type of orientation which Lipps regarded as present in æsthetic experience. We enter into the whole object with a sort of full 'sympathy' with the movements it suggests. We live out the action suggested by the object, but (as Lipps clearly held in his later writings) [25] there is not in us an actual innervation of muscles, as when we literally act. Groos too had maintained that there is an 'inner imitation, an 'inner mimicry' of the object. Langfeld defends similar views in a terminology which avoids the obscurantism characteristic of Lipps.[26]

Whenever we are able to adjust ourselves successfully to a situation, so that our responses are unified into a well-integrated or organized form of action, we call that situation beautiful, and the accompanying feeling one of æsthetic pleasure. . . .

Although the adjustments we are making are those of our organism they are projected into the object which we are observing. In this way they seem to be a part or characteristic of the object. For example, the grace of the serpentine line even though we may know that our pleasure is the immediate result of the ease of our adjustment toward the curve . . . whether a particular adjust-

[24] Bullough, *Brit. J. Psychol.*, 1912–1913, 5, pp. 87–118.

[25] Lipps, T., 'Aesthetische Einfuhlung,' *Zsch. f. Psychol. u. Physiol. der Sinnesorgane*, 1900, 22, pp. 439–440.

[26] Langfeld, H. S., 'The Æsthetic Attitude,' 1920, conclusion.

ment will be a well-organized one, whether indeed it can be carried out at all depends upon both the organism and the object to which it responds.

Delivered from the need for immediate action, the subject may indulge what Ribot has called 'motor imagination,' whose aim is to secure a 'well-integrated' attitude. Thus, the motor interpretation of æsthetic attitude does not contradict the thesis that *creative discovery* lies at the root of æsthetic experience. There is no objection to the pragmatic impulse to regard such motor *Einfuhlung* as the source of future reactions. Surely there is no objection to supposing that a thing is *practical because it is æsthetic*—quite the reverse of the objectionable notion that a thing is *æsthetic because it is practical.* The latter idea is objectionable because it would confine the æsthetic to present possible adjustments; a view which forbids the discovery of novel adjustments possible in the future, an unhappy predicament for a theory which pretends to be 'practical' to get into! Thus, whether we consider æsthetic experience in its perceptual or motor aspects, always it means the emergence of a richer object than immediate practical acquaintance with an object warrants. In Hokusai's 'Wave of the Sea' we have no photographic impression of waves—these waves are like claws or clutching hands. Passivity of attitude correlates with enrichment of the world of objects. H. B. Alexander [27] speaks of beauty as an unrealized good; it is that 'ever-recessive pattern,' divine because never attained. This account of æsthetic experience justifies that instinctive conviction which we all have when contemplating the beautiful, that we see a familiar object revealed in unexpected wealth. How justify that other inveterate conviction, that artists are creators? By recalling that figure-ground perception is a dynamic activity—that the figure is cut out of a ground like sculpture is cut out of stone. Moore unmistakably means this when he declares that consonance arises when the observer accomplishes the unification of a manifold.

If figure-ground perception is the correlative of attitude

[27] Alexander, H. B., 'Nature and Human Nature,' 1923, pp. 144–145.

of the *whole* organism, and if figure-ground perception is dynamic, and not to be explained in terms of passive association, then the differences between such students of the æsthetic as Lipps, Groos, Bullough, Alexander, Langfeld, and Moore, are only mutually fruitful points of view. Now, since all bodily attitude, and the perception from which it arises are both neurologically conditioned, there is no doubt a neurological process which is typical of Moore's type of synthetic perception and the agreeableness which characterizes it. Unless I misunderstand Troland's work on affectivity, he supplies a neurological theory which is in entire harmony with our other present results.[28] Troland sought to define the neurological correlate of the introspective experience of affectivity.

He distinguishes between the *conduction* of nerve currents and the *conductance* of the nerves and synapses. A synapse might conduct volumes of impulses (as in automatic habit action) without at all raising the conductance of the tracts involved. Affective experience, he says, is associated with changes in the conductance of the nerves and synapses. Note, however, that an instance in which a synapse is 'broken through' for the first time, *i.e.*, where nerve currents find *new directions*, would be an instance of altering *conductance*. We quote a paragraph from Troland.[29]

> The affective intensity of any individual consciousness is proportional to the average rate of change of conductance in the synapses, the activities of which are responsible for that consciousness. . . . Accordingly, increasing conductance implies positive affective intensity or pleasantness, while decreasing conductance must involve negative affective intensity or unpleasantness.

Troland himself draws the inference which we require: "The pleasantness thus conditioned is to be identified with that of novel experience." [30] Troland's reconstruction of what occurs in the synapses when we experience pleasure is a direct inference from the facts of the chemistry of nerves

[28] Troland, L. T., 'A System for Explaining Affective Phenomena,' *J. Abn. Psychol.*, 1919–20, 14, pp. 376–387.

[29] Troland, L. T., *op. cit.*, p. 377.

[30] Troland, L. T., *op. cit.*, p. 378.

of which he has always been a close student,[31] and from the facts of pleasure experience. When too frequently experienced, a given activity loses its pleasurableness, and becomes neutral or indifferent: conductance has reached a limit and leaves only conduction. When we become 'educated' to the harmonies of a Strawinski chord, this means that old conductions give way to new conductances; pleasure parallels novelty. Moore states the same fact from the perceptual point of view when he says that perception is pleasurable when it encounters a new task—and the task of perception is to elicit a unified whole out of an apparent conglomerate of sensations.

V. Orientation of Logico-Æsthetic Theories

There is constant friction between psychological students of the æsthetic, and the critical and practical votaries of art. One way in which this arises is as follows: The psychologist, with an eye on inner experience of beauty, and wishing to study it empirically, employs his two methods of *impression* and *expression*. In the first, he presents material to his subject who must choose the 'more beautiful.' But, because of the widespread tyranny of the *consensus gentium*, the subject almost invariably takes this instruction to mean, 'choose the one which you find agreeable.' Indeed, psychologists themselves are in the inveterate habit of confusing the affective and the æsthetic. The main consequences of this procedure are as follows: (1) The artist, with an eye on the æsthetic object, at once declares this method an enormity. What is beautiful cannot be determined by taking a statistical vote based on what the average observer finds agreeable. Many æstheticians reject absolutely the notion that in art (as in exact science) truth can be mechanically secured by experimental induction of the *mass* variety. They insist on 'good taste' in place of 'average taste' as a criterion. But now this notion of 'good taste,' having no accepted definition, is forthwith assumed as a personal possession by every artist—

[31] Troland, L. T., 'Mystery of Mind,' 1926, Chs. 12 and 13.

and we are delivered from the narrow restrictions of Corot (whose work everyone finds beautiful) only to flounder in the unbridled whimsies of 'cubism,' 'symbolism,' and 'post-impressionism,' all of which pass muster on the notion that good taste, whatever else it is, is highly individual! What we require is a golden mean, and Moore's theory seems to supply it: the beautiful is that which we can resolve to meaningful form with difficulty, but not too much difficulty.

A second objection to psychological work in æsthetics is the failure to distinguish the physical object from the artistic object. A laboratory subject is generally not warned to note the difference between what the object is, and how it is presented. This, to the artist, is enormity number two, for the object portrayed may be the most repulsive to our instincts and may nevertheless be æsthetically agreeable. The artist means that there is *worth* in the *manner* in which this object is presented, no matter how ugly it may be to practical judgment. The artistic creation is not photographic, it is perceptual. When Hokusai makes his waves claw-like, he is painting a form which the waves fit as by a sort of sympathy; he compels their meaning-form to emerge. We find his portrayal agreeable despite their unpleasant instinctive significations because it aids our halting synthetic powers. This leaves to the notion of 'good taste' a specific meaning, and it leaves to the artist that undoubted rôle which he plays in the education of humanity. The artist is the seer who does pioneer work in perceptual understanding, in finding the hidden possibilities in our perceptual world. He teaches us by example rather than by precept, because in contemplating a work of art, we literally seek to 'walk' in his 'perceptual steps.' In short, the mission of art is to bring humanity in touch with a fuller reality in objects than ordinary perception permits, because the need for action presses too closely in its wake.

A third virtue of Moore's theory, which it shares with Langfeld's motor theory, is the wide range of objects which it makes available for æsthetic contemplation. Langfeld regards a situation beautiful when we achieve an adjustment

towards it which is highly unified and organized. "In principle such an attitude can be assumed towards any object from fountain pens to 'Paradise Lost.'" [32] This sustains Sully's objection to Hegel's confinement of æsthetic experience to hearing and vision. Every sense mode can mediate perception, and can therefore offer a task for perceptual synthesis, or motor synthesis. Only smell and taste are of necessity so closely bound up with action that their perception is mostly of the analytic type. Nor need these principles of artistic appreciation leave out the cognitive sphere.

In the fourth place, this theory allows us to say that beauty is indeed objective, that the object plays an indispensable rôle in æsthetic perception. Says Langfeld of his motor theory, "Although the adjustments we are making are those of our organism they are projected into the object which we are observing. . . . Strictly, however, neither grace nor any other form of beauty is in the object or in the organism. Beauty is a specific relation of the two . . . ." [33] The fact that the object plays a specific rôle is clearly implied in this. Add that some objects are æsthetically neutral because they allow an integrated attitude too easily for most of us, and that some objects are æsthetically unpleasant because such an integrated attitude is too difficult to find, and we have the essentials of the perceptual theory we defend. On the perceptual side, beauty is *in* the object by virtue of being a form which can be discovered. But if the discovery is difficult, when it is finally obtained, it has in a true sense been *made*. Perception and bodily attitude are two stages of the same process—a perception is a reaction in its incipiency.

[32] Langfeld, H. S., 'The Æsthetic Attitude,' 1920, conclusion.

[33] Langfeld, H. S., 'The Æsthetic Attitude,' 1920, conclusion.

PHYSICAL AND PSYCHOLOGICAL REALITY

BY KARL F. MUENZINGER

University of Colorado

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In this article an attempt is made to draw the necessary conclusions in regard to psychology from the fact that physical science is based on the abstraction from the personality of the observer. Without argument we would have to admit that a psychology based on the concepts of physical science should be capable of giving a complete account of human behavior within the limitations of that abstraction. Such an account, however, would be a part of the account of physical reality. On the other hand, the life which we immediately experience can also form the material of a science without that abstraction. Such a psychology would be an account of psychological reality which is prior to physical reality. Of these two possible approaches to psychology it is maintained that the latter is more adequate and important than the former.

I. The Problem

The pursuance of further ends and the choice of means for their attainment are thus the mark and criterion of the presence of mentality in a phenomenon. We all use this test to discriminate between an intelligent and a mechanical performance (1).

The pursuance of further ends is an ever present fact in our waking life and even in our dreams it is not absent. The world assumes, by force of such purposes, an ever changing pattern in which certain features are relevant to our purposes and others are not. It is through our purposes

that we conquer and control our environment in order to reach our ultimate aims. This is our primary and immediate experience; this constitutes the core of living.

It is this experience that determines the primitive man's thinking when he explains this world and tries to control it. Not only other human beings and animals, but trees, rivers, clouds, stars, rocks and weapons are endowed with purpose and design. The science of our own civilization presents a definite attempt to get away from such animistic concepts, and especially since Galileo do we have a consistent development of scientific thinking based on the concept of observation of the relation between variables. We have heard the playful boast that we are attempting to write the equation of the universe. The world, which is primarily an inseparable part of our experience, is thus being artificially detached from us with the twofold result that in its scientific reconstruction it represents an abstraction from the experiencing subject and excludes rigorously the concept of purpose. It is true that it is man who sees the stars; it is within the changing purposive activity of man that the stars assume various meanings as when he sits under a tree with his lover, is alone in desert or ocean, or is awake in the observatory. Yet the science of the stars disregards the one who sees them and in whom they play a rôle according to the particular phase of the personal drama. This is as it should be. It is this attitude of mind that has made possible the development of the science of the Western Civilization. It is through this abstraction from the observer and a disregard of his purposes that we know the world—but not including man—better than former generations.

The history of science since Galileo shows an ever widening field that is jealously, though not always successfully, guarded against the intrusion of such 'unscientific' concepts as point of view, quality, purpose, and meaning.[1] The momentum accumulated by a successful application carried the concepts

[1] Was the popular interest in the Special Theory of Relativity due to the fact that here at least the standpoint of the observer in a restricted sense had to be admitted as a primary factor in viewing this world?

of physical science, measurement by observation and verification, and relation between variables expressed in numbers, into every line of endeavor by man to understand this world, and created the additional concept that any phenomenon of experience must be capable of statement in physical or chemical terms until at last we even find psychologists making a resolute attempt to interpret man's own nature entirely in such terms. In historical retrospection we may well say that such a culmination was inevitable. And we may add that the more resolutely and single-mindedly such an attempt is carried out the better it will be for our understanding of human nature. It will either show that it is the only adequate way to furnish us such knowledge, or it will show its inadequacy and force us to concentrate on a different approach. Although the future will probably settle this question, it may not only be of interest, but also of advantage, to try to see now whether the approach through the interpretation by natural science holds a greater promise than the approach through the interpretation in terms of purpose and meaning in helping us to reach our goal—an understanding of human nature. Would the reduction of the psychological reality in which we live, with its wishes, hopes, and values, to a physical and chemical reality really give us such an understanding? Or would it only give us a substitute for a real understanding which is possible through another method that has already proven successful?

II. The Behavioristic Account

The movement called Behaviorism embodies the belief that psychological phenomena can be successfully reduced to physiological phenomena and physico-chemical phenomena. Its fundamental assumptions have been stated by Lashley (2) as follows:

> Its [*i.e.*, strict Behaviorism's] physiological account of behavior will also be a complete and adequate account of all the phenomena of consciousness. . . . [It insists] that the concepts of the physical sciences are the only ones which can serve as a basis for a science,

and . . . [it demands] that all psychological data, however obtained, shall be subjected to physical and physiological interpretation.

He then describes a hypothetical conscious machine upon which certain physical phenomena are permitted to act, such as ether waves of a certain length (light). The delicate mechanism, otherwise known as man, is thereby stimulated and finally reacts according to the limitations and determinations of its various ingenious devices. With a little retouching this robot, drawn without any intentional irony, could also be made to act purposively; that is, its internal structure might be imagined to be arranged in such a way that for some time only stimuli patterns of a certain sort would filter through its sensory portals, and only reactions of a certain kind could be observed. This then is a picture of what we might get in an attempt to reduce psychological data to physical and physiological data. It would seem also that this is the logical end of physiological psychology which has always insisted on such a reduction. If this is Behaviorism, then we can see the possibility of two branches of the movement, one of physiological Behaviorism that is satisfied with a physiological account, and one of physical Behaviorism that demands an interpretation of a physiological account in terms of physics and chemistry.

Before attempting to evaluate this hope, and this is all it is at present, of describing man as a conscious machine, it might be well perhaps to answer the most common criticism against Behaviorism. It is often stated that physiological Behaviorism is unscientific in its neglect of conscious phenomena which undeniably exist and therefore ought to be included in an analysis of human behavior. But this introduces an assumption which is untrue, namely, that Behaviorism is in the field merely to enumerate and describe all aspects of human behavior. If I understand this movement correctly, it aims to give a causal account of behavior. Starting with the premise that the concepts of physical science are sufficient for such an account, 'being the only

ones that can serve as a basis for a science,' it must necessarily arrive at a point where the phenomena of consciousness dissolve like a mist before the relentless sun of science, leaving only processes in neurones, glands, and muscles. It does not seem to be stubbornness that makes a behaviorist 'exclude' consciousness, but strict logical necessity spurning him on his path and giving the movement the charm and attractiveness that partly explain its wide popularity.

I shall admit theoretically that it is possible to give an account of behavior in terms of physiology or even physics and chemistry. Will such an account be adequate? Where will we have arrived when this goal is partially reached? What does such an account mean? Have we achieved what we set out to do? And we have set out to achieve an understanding of human nature.

III. Purposive Psychology *vs.* Behaviorism

Purposive[2] psychology, insisting that psychological data shall be interpreted in terms of the primary experiences, purpose and meaning, has a number of answers to these questions which I shall list in the order of their importance.

1. We now know purpose, desire, hope, meaning, as man has always known them. Why not use these as categories of description since their physiological and neurological nature is still largely a matter of conjecture and will probably remain so for a long time to come?—This is clearly an inconclusive and makeshift position. Physiological and neurological knowledge will increase—at what rate we cannot predict—and the time would come when the physics and chemistry of physiological processes would be known well enough to replace psychology.

2. Our conceptual thinking about human behavior does not run in the same channels as those in which our conceptual thinking in physics and chemistry runs. Therefore we shall

[2] McDougall seems to have been the first one to use the adjective 'purposive' in such a context, just as he was the first to demand that psychology should be a science of behavior (3). He might be called a psychological Behaviorist if he did not disclaim so vigorously all connection with Behaviorism.

always have to use the terms hope, aim, despair, satisfaction, and similar ones, at least as a shorthand for the particular physiological mechanisms. This seems to be a more valid answer, although we must admit that the situation may change and that under the influence of physical science our thinking and speaking might develop a conceptual vocabulary based wholly upon the abstractions of present scientific methods. (A fear that our literary treasures would then have to be junked or translated into the jargon of potentials, gradients, and the like, would then be merely a historical prejudice.)

3. A physiological account of psychological data will be little more than a rationalization of human experience. It comes after the fact and tells us what was probably happening physiologically when I intended to do a certain thing, while a psychological account deals directly with the phenomena involved or at least may do so in many favorable cases.

4. A physiological or physico-chemical account of psychological data is *meaningless* if my aim is an understanding of human nature. From this point of view, physiological and physical Behaviorism can never arrive at an adequate account of purposive activity, because it excludes the categories of purpose and meaning, although its account may be adequate from the point of view of physical science. Suppose that Watson's theory were correct, that thinking is responding 'implicitly,' that is, through 'subvocal talking, general body language habits, bodily sets or attitudes which are not easily observable without instrumentation or experimental aid' (4) and suppose that we actually had observed and described such implicit responses of a subject for a space of time, would this description be adequate unless it were interpreted in terms of the subject's immediate experience of thinking, whether reported by him or inferred by the psychologist? While a statement of psychological data in psychological terms seems to be the only intelligible procedure, there has always been a tendency to a statement in terms of neurology and physiology. The literature is full of speculations, sometimes reported as facts, about the neurological and physio-

logical mechanisms of certain mental data, as if such hypotheses, even if they turned out to be facts, could ever explain, or account for, mental processes. Such an account has meaning only if the aim is to show how behavior is conditioned and limited by the physiological and neurological equipment of the organism. They are the channels in which life flows, but they do not give it its direction and its goal. It is customary to call purposive psychology, on account of its insistence upon psychological interpretation of behavior, animistic or voluntaristic. To this one is tempted to reply, What of it, if it is the only way to achieve understanding?

5. A psychological account of psychological data is more *important* than an account in terms of physiological or physico-chemical phenomena. This is a purely pragmatic reason ordinarily having no place in pure science which acclaims the ideal, "Suche die Wahrheit und frage nicht, was sie nuetze." But where a science of human life is concerned we are intensely utilitarian; we are in quest of knowledge that has a bearing on our own and our neighbor's conduct. We want to know the causes of normal and abnormal conduct. We want to know how abnormal conduct can be righted and how we can avoid the development of the abnormal altogether. If we look at the sources of our present knowledge of this kind, as McDougall advises us to do (**5**), it would seem that a purposive psychology is more important than a physiological Behaviorism. He points out that those who adhere to a purposive, dynamic psychology, among whom the psychoanalysts occupy no mean place, are the ones that have given us the bulk of our present scientific knowledge of the abnormal mind, which at the same time is the most important present approach to our knowledge of normal human behavior. A physico-chemical account, whose possibility I theoretically admit and which would probably be adequate from the point of view of physical science, would be unimportant here, because it would have to be restated in psychological terms before it could be of use to us. In this connection it is interesting to point out that Watson, who loses no opportunity to pay his regards to the mysticism of the Freudians, makes

considerable use of their material in his textbook 'Psychology from the Standpoint of a Behaviorist,' especially in the chapters on Emotions and Personality. This is no plea for psychoanalytic theory which may be as fantastic as the neurological patterns offered to us by others. This is merely insisting that the psychoanalysts and those of a similar psychodynamic mode of thinking are the ones that have given us the most valuable portion of our knowledge of the facts of normal and abnormal behavior, that kind of knowledge which Watson demands so energetically and to which he himself has made such valuable contributions as his study of infants. The theoretical difference between physiological Behaviorism and purposive psychology seems to be that the former wants to reduce dynamic life to a mechanistic and materialistic account and the latter to a dynamic and psychological account.

Of these five reasons advanced to refute the claims of physiological Behaviorism as to an adequate account of psychological data, the first two may be discounted; while the last three, that such an account would be a rationalization, meaningless and unimportant, seem to be valid under a definite condition, namely that we assume our aim to be an understanding of human nature, that is, an account of behavior in terms of our immediate experience. Of course, if we assume that our aim is to give an account of behavior in the same terms in which we describe the actions of billiard balls, or of iron filings in a magnetic field, or the effect of light upon a photographic plate, then it must be admitted that such an account would have meaning and be adequate.

The next question that arises is whether purposive psychology can be a science although its primary aim is not to interpret its data in terms of physical science.

IV. Purposive Psychology as a Science

It has been said that a purposive psychology could not be a strict science. Some of the important criticisms are summarized and discussed below. Perhaps it ought to be stated at the outset that this discussion is not intended to

have any bearing upon the question of the existence of instincts in man.

1. One criticism is that it is unscientific to give an account of behavior in terms of purpose because this would be making certain forces the ultimate causes of behavior. Dewey points out that "science and invention did not get on as long as men indulged in the notion of special forces to account for such (physical) phenomena. Men tried that road and it only led them into learned ignorance. They spoke of nature's abhorrence of a vacuum; of a force of combustion; . . . of heaviness and levity as forces. . . . Advance in insight and control came only when the mind turned squarely around. After it had dawned upon inquirers that their alleged causal forces were only names which condensed into duplicate form a variety of complex occurrences, they set about breaking up phenomena into minute details and searching for correlations. . . . Correspondence of variations of elements took the place of large and imposing forces" (6). Dewey is here objecting to the concept of instincts. The same objection may, however, also be raised against the concept of purpose of which instinct would be a special case. The answer to this criticism is that it would, of course, be unscientific to reduce behavior to certain forces as ultimate causes and stop there, but this is not at all implied in the analysis of purposive psychology. There is a danger of falling into such a method wherever instincts are assumed to be present. Where purposes are observed the aim must be, as pointed out below, to find out how they have come about, how they are conditioned, and how they run their course. Without this procedure, understanding and control would not reach very far. Psychologists with the purposive point of view, and especially those who have established the psychogenetic origin of certain mental disorders, have never been content with merely referring to a purpose in order to account for a certain group of symptoms. They have developed methods by which the origin of the abnormal purpose could be ascertained so that its conditions would be known and become amenable to modification, resulting in a modification of the

symptoms themselves. The results which these psychologists had in changing abnormal behavior must be due to their correct analysis of purposive behavior. It is true, they usually went further and speculated about the ultimate nature of purpose. Their mistakes, however, are no proof that purposive psychology must necessarily be unscientific. I submit that at the present state of our knowledge it is no more mystical to reduce purposes to a libido than to reduce thinking to implicit motor responses.

2. Another criticism is that science is concerned only with the observable; since purpose is not observable, purposive psychology is unscientific. The answer to this criticism is contained in the answer to the fundamental question, What is a purpose? Purposive activity is marked by the unity of certain simultaneous and successive phases of behavior, a unity within which objects and acts assume a definite function with regard to a certain end. This unity is observable by others than the acting subject, and on the other hand this subject is immediately aware of it as a purpose. In reporting about it, he is the instrument through which psychologists reconstruct the purpose whose manifestations they have observed as a purposive unity of activities, that is, activities that cannot be predicted solely from the nature of the acting organism nor the particular environmental situation, but on the basis of a purpose. The difficulties of the psychological analysis are caused by the fact that the observer is usually confronted with more than one possible unity into which the same activities may be grouped, and that the subject himself may be unable to give a correct account of the purpose or that he may even be unaware of the real purpose. If the subject were always aware of his purposes in their entirety, and if the observers could always observe the actual purposive unities of behavior, an understanding of human nature would be a simple thing and psychology perhaps unnecessary. As it is, we have the difficulties of the variety of unities into which the same behavior may fit, and of the partially known, loosely knit, and spurious unities. It seems that one chief aim of psychology would be to ascertain and analyze the

real purposes in behavior; to show under what conditions they have arisen and will arise (whether they contain innate or acquired elements, whether they were integrated by chance or by insight, etc.); to describe how they interact and conflict and how they may be changed or displaced; and finally to describe meaning as a function of the purpose and to show how the same situation can have various meanings according to the different purposes within which it is met. Perhaps we should add that the awareness of the purpose is never a purely intellectual function, but a dynamic something which has its cognitive and affective aspects, and with whose ultimate nature we are not concerned in psychology. We can only say, such is life, and accept the fact.

3. It might still be objected: The purpose of which you speak can be observed only by one subject, it is therefore a subjective datum and science can deal only with objective data. To this it must be replied that we are concerned with purposive activities as well as with purposes. The former are capable of objective observation on the basis of which the latter are reconstructed and then, if that is possible, compared with the reports of the subjects. Subjective verification is here used in addition to the usual methods of natural science, objective observation and inference.

4. It might further be said that the objective observation of purposive activities is all that is necessary, and that one need not take into account the inferred or subjectively reported purpose. To this it must be replied that the observation of a purposive unity in behavior is impossible without reference to an inferred purpose and, what is more, it would be without meaning.

5. Another possible criticism is that the method of physical science is to break up complex processes into their elements and study the interrelation of these thereby arriving at an understanding of the complex processes; purposive psychology turns the method around beginning with an attempt to understand complex processes before the interrelation of the minute elements has been studied; therefore it is unscientific. In physical science the principle to proceed from

the simple to the complex has met with success. This is, however, no reason why it should be the only direction to be followed. It has been tried in psychology, but only with partial success. The mode of attack was to find the elements of consciousness and compound them into 'higher' processes. The success was apparent in the psychology of sensations, but less so as regards an understanding of those higher processes about which we are most concerned. Rosenow (7) has called attention to the relative unimportance of the results of an experimental psychology of this kind. A physiological Behaviorism will perhaps also be successful through an adherence to that principle. But a purposive psychology or a psychological Behaviorism must reverse it, because the whole is given in our experience first and its understanding cannot be achieved by building a mosaic of elements. Proceeding from the simple to the complex cannot explain the complex in psychology, because the elements assume their peculiar significance only as parts of the complex, and if considered alone they lack that meaning (8). If purposive psychology in using the principle 'Proceed from the complex to the simple' is approaching its goal—and it seems to be doing so in psychopathology—then the charge that the method is unscientific is without basis.

V. Implications of Purposive Psychology

We have finally arrived at the question: What does adherence to the point of view of purposive psychology imply?

There is a general answer that can be given to this question: The point of view of purposive psychology would mean that we study behavior within the psychological reality in which man lives and from which we derive a physical reality only by abstraction. While an understanding of physical reality (including the knowledge produced by a physiological Behaviorism) probably cannot be reached by any other road than that of abstraction from the experiencing individual, his own nature can be understood only by taking into consideration the psychological reality as he experiences

it immediately. Purposive psychology is based on such a consideration.

There are also several specific answers that can be given:

1. It means that behavior is interpreted in terms of mental processes and not in terms of physiological and physical phenomena.

2. It means that purpose is recognized as the primary process of life of which the subject may be more or less aware and which can be objectively observed as purposive activity. This process like any other phenomenon of experience has an origin which can be studied and reconstructed, paving the way for prediction and control of behavior. Such a genetic study, of course, does not aim to account for the ultimate nature of the purpose of the moment, for as Broad has pointed out (9) the genetic method does not necessarily arrive at an explanation.

3. It means that psychology recognizes that each individual lives in his own psychological world and not in the world 'as it is,' that is, as it is seen by the abstraction of physical science. Purposive activity creates the environment to which the living organism responds. This is especially true of our social environment. We never react to our neighbors as they really are, but as we think they are. This creation of the environment is limited by the organism's equipment and the material is selected from the world as it is. Within this limitation and selection the creative purposive activity imposes a pattern upon the physical and social environments, transforming them into the psychological reality within which each part assumes its appropriate function, called meaning. Given several individuals we get as many different psychological realities. This is a well-known fact of everyday life. To the psychologist it is not entirely unknown, but nowhere except in modern psychopathology does it receive its due consideration. Thurstone has called attention to a creative activity of cravings, which we would consider as special cases of purposive activity, prior to the stimulus in his discussion of 'The Response

Fallacy in Psychology,' stating boldly that "the stimulus is not the starting point for behavior" (10).

4. It means in a more specific sense that the psychologist recognizes the relativity of the stimulus situation. Purpose as the primary fact of experience determines the value and character of the stimulus as well as of the response. Given different purposes of the same individual we get as many different meanings and values of the same stimulus and consequently as many different responses. This relativity of the stimulus is not the one usually described, *e.g.*, in Thorndike's textbook (11), as the effect of past experiences, associated ideas, etc., but it is the effect of the purposive activity of the moment.

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DISCUSSION

THE REFRACTORY PERIOD IN ASSOCIATIVE PROCESSES

Dodge ('26) has suggested that the refractory period may be a factor of great consequence in even very complex forms of modifiability or learning. This suggestion is so pregnant with possibilities that I venture to report certain facts which may bear upon it, although I lack time to make sure that they do bear upon it, much less what their exact bearing is.

In a certain experiment, six subjects wrote a number (from 0 to 9) whenever they heard a word. 3,840 words were read, 320 at a sitting, including 60 occurrences of each of two words, and 40 occurrences of each of ten others, and from one to ten occurrences of several hundred other words. The experiment was designed as one of many to throw light on the influence of repetition. This purpose was somewhat masked by presenting the experiment as one on "thought-transference and other problems." The subjects were told that when the experimenter read a word he would think of some number from 0 to 9, and that they should write the first of these numbers that came to their minds, and that in any event they should write some number from 0 to 9 for each word by the time the next word was spoken. The words were read at the rate approximately of one every 2½ seconds. They were thus left free to write numbers from 0 to 9 in a perfectly chance order. The maximum interval from the beginning of writing one to the beginning of writing the next would be about 4 seconds; the minimum about ½ second (in cases where the number for the preceding word was not written until the next word was begun). The oft repeated words still came only rarely compared with the total number, and there was no statement or hint that the experimenter would always think of the same digit for the same word. The subjects did not in fact come to form stable associations with the repeated words, save very rarely, within the first 2,560 responses (which are all that are used here). It would have made very little difference if they had.

By chance there should be at least ten percent of sequences like 00, 11, 22, 33, 44, etc. There would in fact be more than ten percent, since all the subjects had more or less favored numbers. The number of sequences (00, 11, 22, etc.) is far below this in five of the six subjects, and slightly below it in the other, being as follows:

	C	M	P	R	S	W	Total
Day 1—First 320 responses	23	22	6	17	12	50	130
Second 320 responses	10	12	18	13	11	35	99
Day 2—Third 320 responses	7	13	21	9	13	22	85
Fourth 320 responses	7	5	6	8	12	48	86
First 1,280 responses	47	52	51	47	48	155	
% in 1st 1,280	3.7	4.1	4.0	3.7	3.8	12.1	
Day 3—Fifth 320 responses	17	3	6	7	8	22	63
Sixth 320 responses	22	14	6	12	12	32	98
Day 4—Seventh 320 responses	5	5	12	13	9	14	58
Eighth 320 responses	8	0	10	9	7	10	44
Second 1,280 responses	52	22	34	41	36	78	
% in 2d 1,280	4.1	1.6	2.7	3.2	2.8	6.1	

The increasing avoidance of sequences from sitting to sitting and day to day is noteworthy.

In a somewhat similar experiment where numbers from 1 to 9 were written, under the same time conditions, the following results were obtained, all in one sitting:

NUMBER OF SEQUENCES OF 11, 22, 33, ETC.

	A	B	C	D	E	F	G	H	Total
First 320	10	0	8	19	7	27	5	10	86
Second 320	4	1	8	14	5	31	19	9	91
Third 320	8	1	21	15	7	17	21	8	98
Entire 960	22	2	37	48	19	75	45	27	
% in 960	2.3	0.2	3.9	5.0	2.0	7.8	4.7	2.8	

Chance should give 11.1 percent as a maximum, since there were only nine digits used and there was considerable favoritism in numbers.

In an experiment of the same general nature,[1] but with a time interval of 5 seconds between the reading of the words (nonsense syllables in this case), the avoidance of sequences is not nearly so

[1] Hundreds of nonsense syllables were read and the first number of the numbers 0 to 9 which came to mind was to be written after each. The reading had been preceded by a presentation in which forty of the nonsense syllables had been connected, each with certain numbers.

great as in the experiments with the 2½ second interval. The facts for eight subjects for the first 640 responses are as follows:

	F	G	H	K	M	Wag	Wa	Wi
First 320 responses.....	23	5	23	16	31	21	32	6
Second 320 responses.....	59	33	27	24	46	29	39	7

I am by no means sure that the avoidance of sequences in these experiments is chiefly due to any fundamental intrinsic unreadiness of a process to act again soon after it has acted. On the contrary, I think it likely that the subjects were much influenced by factors extrinsic to the process of thinking and writing 0, 1, 2, 3, etc., such as an expectation that the numbers should change, and a sense of the impropriety of writing the same number too often within any short sequence. My reasons for thinking so are partly general *a priori* reasons, and partly the following: The increasing avoidance of sequences from day to day seems to involve something more complex than the refractory period, as this is usually described by physiologists. The avoidance of sequences with an interval of 5 seconds, though it does diminish greatly, does not diminish so much as I should expect if the avoidance of sequences were purely the result of a refractory period. These particular experiments are then inconclusive, but it should be possible to devise experiments in which the avoidance of sequences would be a fairly crucial test of the existence and influence of a refractory phase in the associative processes.

Professor Dodge has been so good as to comment on these results. I am in entire agreement with his interpretation of them. The general observations which they have called forth from him are of much more interest than my experiments.

EDWARD L. THORNDIKE

INSTITUTE OF EDUCATIONAL RESEARCH,
TEACHERS COLLEGE, COLUMBIA UNIVERSITY

NOTE ON PROFESSOR THORNDIKE'S EXPERIMENT

The foregoing report by Professor Thorndike represents an exploratory but direct experimental attack on the problem of the influence of the refractory phase on free association. The general question might be stated as follows: Does the associative process furnish any evidence of a barrier against immediate repetition that can be identified with refractory phase? Taken by themselves the experimental results give a quantitative indication of some tendency of the subjects to distribute associations and consequent responses within the limits of an arbitrarily limited system. Thorndike raised the question of the nature of this tendency, but did not subject it to experimental analysis.

Several plausible hypotheses occur to one to account for the experimental results. In the first place, it is possible that the subjects developed a conscious or unconscious bias in favor of the distribution of their associative response. This might easily have arisen in some of the subjects as a reasonable interpretation of the instructions. But assuming that it was a chance interpretation of instructions which themselves gave no real clues, it would be surprising if the same bias developed unanimously in all subjects unless there existed some fundamental tendency towards that particular bias. In the second place, the general tendency of the subjects to distribute their responses might represent a habit of the group. It probably does. But if that habit is a casual result of experience and training, one would expect some exceptions in a group of even moderate size. Its unanimity and consistency suggest some underlying tendency to account for it. Thus, in whatever way they are viewed, Professor Thorndike's experiments seem to me to point to the operation of some general or common barrier against immediate repetition, but hypotheses as to the nature of that barrier including the supposition of a refractory phase rest on other grounds.

It is not difficult to imagine a crucial extension of Professor Thorndike's experiment. If various time intervals between stimuli could be used, a suppositious refractory phase in the barrier against repetition should theoretically be more apparent the nearer the responses approach each other in time. Conversely, the longer the

time interval between responses the less such a barrier should operate. Furthermore, if the tendency is really due to refractory phase, one would expect, other things being equal, a critical frequency at which the tendency to repetition would be equal to expectation by chance, and a subsequent period of rebound during which the tendency to repeat would be exaggerated.

Something like this sequence appears in various cases of free association and constructive imagination, where experimentally induced bias is precluded and where the satisfaction of the reactor is the principal determinant.

In good writing, for example, there is a marked reluctance to repeat sounds, words, phrases, or paragraphs. This does not represent an absolute barrier, but a relative reluctance decreasing with time. Repetitions of the same word or phrase may be close enough together to reinforce each other, apparently constituting a single stimulus. A little farther apart they tend to annoy and disturb the reader. Still further separation may render the repetition entirely satisfactory. Under certain circumstances even paragraphs may be repeated without serious offense, as in the summary of a paper. A sequence corresponding to refractory phase and the rebound is even clearer in some works of art where the play of association and constructive imagination is determined more exclusively by its satisfactoriness. In poetry, for example, rhythm, rhyme, and the repetitions of sounds and phrases with slight modification are illustrations of the point. Here again repetitions may be close enough to reinforce one another. Such reinforcement may under favorable circumstances reach a kind of ecstasy, as in the beating of drums and in negro spirituals. The evolution of melodic themes indicates some barrier against simple repetition within rather definite intervals. The repetition of musical phrases in many forms of music at longer intervals and the repetitions that are permissible in choruses all look in the direction of increased readiness to respond.

Probably all artistic composition is a kind of free association governed fundamentally by the satisfactoriness of the productive activity or the art products. Even artistic sophistication and tradition doubtless start there. Time measurement of these reinforcements, barriers, and predispositions to repetition in writing and music is entirely feasible. It would seem to be another practicable avenue of approach to a scientific evaluation of the influence of refractory phase in free association. Doubtless something similar

also appears in other forms of art, as in the recurrence of motifs in decorative art and architecture.

The operation of all such barriers and predisposition to repetition is probably complicated by the complexity or refinement of organization of the systems in which they appear. In some primitive or relatively less developed systems the refractory phase is apparently shorter than it is in more developed and more complex systems. There is some evidence of this in the reactions of children and infra-human species. Refractory phase may also be very short in certain dementias, which are characterized by stereotypy. High intellectual development seems to increase the barrier against repetition. At present all this is merely conjecture. What we need is quantitative data as to the facts. Apparent evidence of the influence of refractory phase and rebound is found also in the distribution of optimal repetitions in the learning process. This again may differ in children from what it is in adults. Finally, the barrier to repetition may vary apparently within the individual's experience, as the process becomes relatively automatic. Robinson and Bills [1] found that rapid repetition of homogeneous responses succeeded best without full attention, while the subject carried on concurrent day dreams. This looks to me like an experimental verification of the advantage of simple forms of mental organization. Perhaps the agreeableness of the day dreams was not insignificant.

There are some grounds in every day experiences for supposing that an effective reinforcement of either the perseveration tendency or its barrier is possible. The effects of prizes and rewards on the one hand and punishment on the other look like something of this sort. Something similar seems to appear in the emotional reinforcement of mental stereotypy in worry, and the unrational repetitions of behavior in other emotional states.

The concomitance between affective experience and readiness to respond has been given theoretical significance by Thorndike himself in his hypothesis of the nature of feeling. The theory has never received the experimental verification that it seems to me to deserve. I have no new grounds for identifying the two phenomena, but some close relationship seems to me highly probable on the basis of common experience.

As I have elsewhere pointed out, if the principle of refractory phase does not apply to mental life, there is something so similar to

[1] Robinson, E. S., and Bills, A. G., 'Two Factors in the Work Decrement,' *J. Exper. Psychol.*, 1926, 9, 415–443.

it that it is at present indistinguishable from it. If physiologists had not discovered the principle, psychologists would have had to postulate it to account for the control of the perseveration tendency. Unless recency of human reaction involved some agency that operated to delay repetition, the perseveration tendency would tend to make us live out our lives on the low level of stereotypy within the limits of relative fatigue or exhaustion. One conjectures that this barrier against repetition plays an important rôle not only in the common desire of humanity for variety and new experiences and in the evolution of art but also that it is somehow involved in the very foundations of science as a condition of the tendency of specific human experiences to undergo systematization and generalization. It may thus have been an important factor in the development of science as well as art.

RAYMOND DODGE

INSTITUTE OF PSYCHOLOGY,
YALE UNIVERSITY

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